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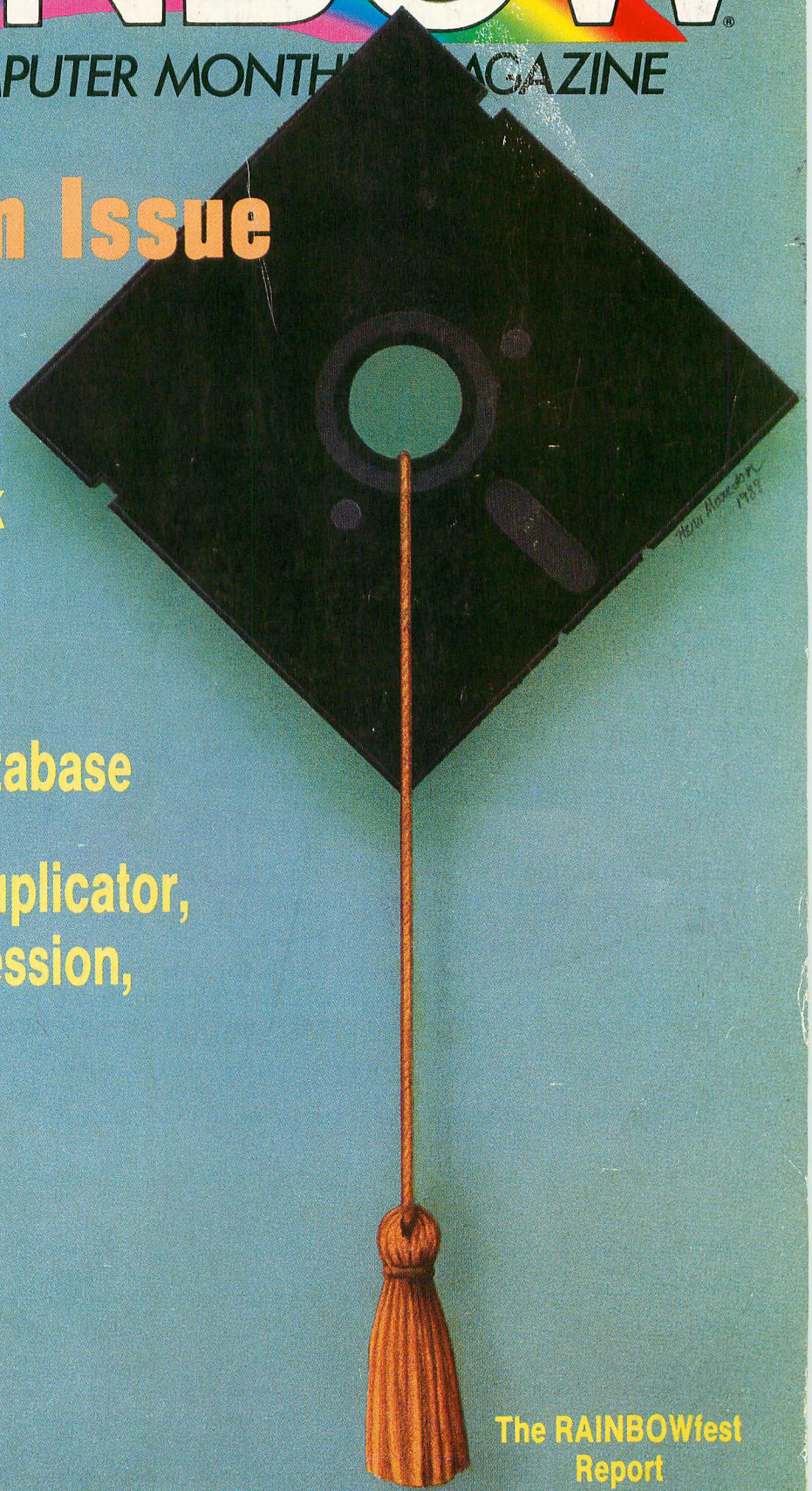

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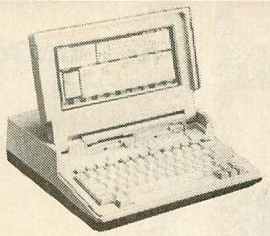

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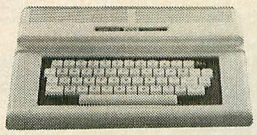

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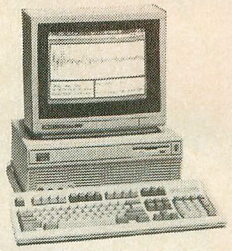

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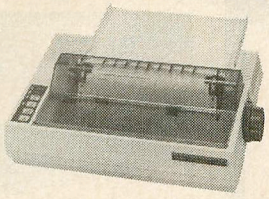

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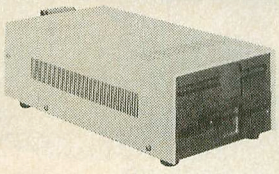

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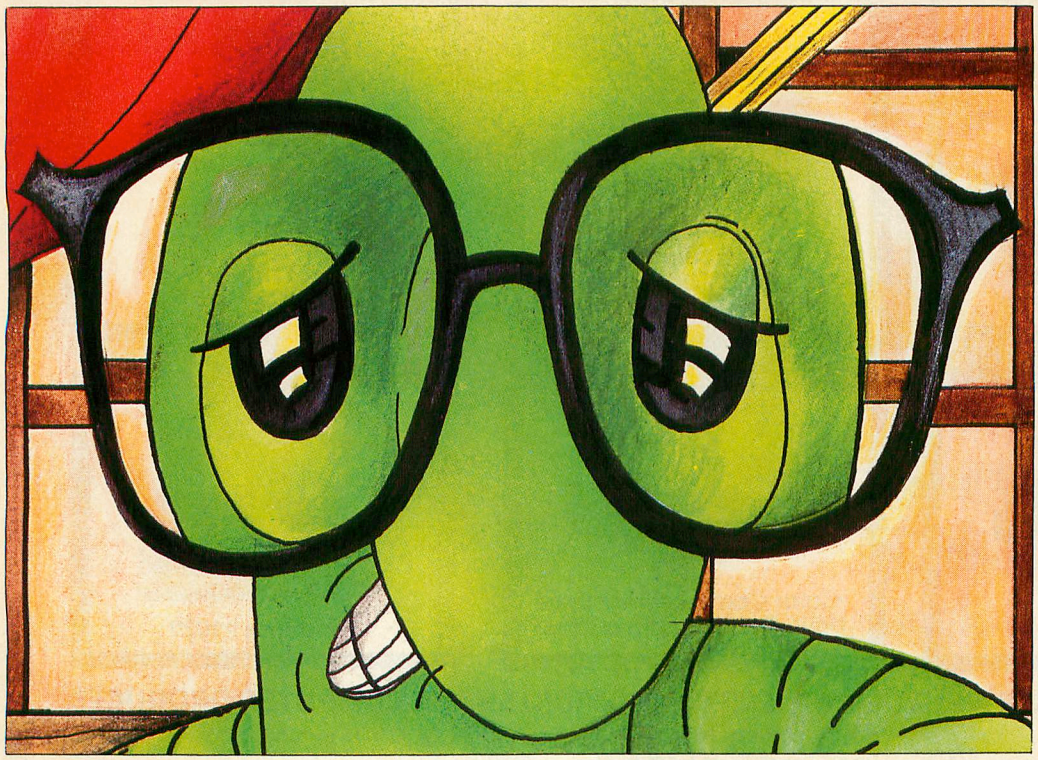

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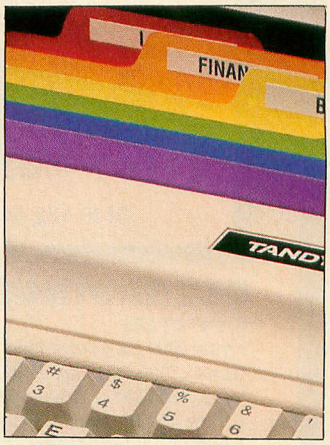

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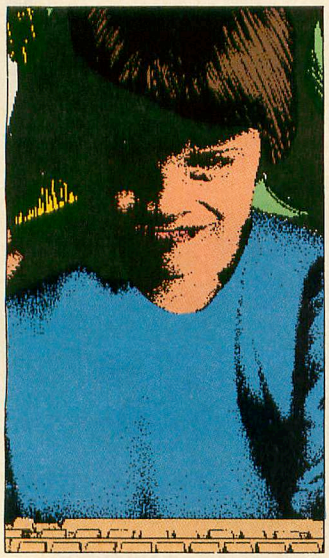

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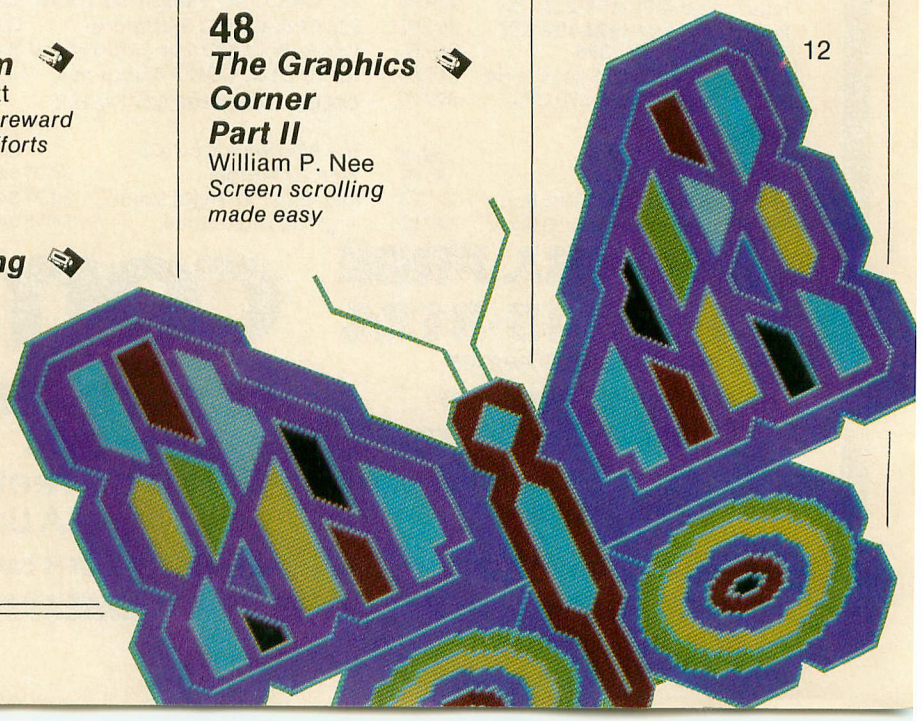

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Letters to the RAINBOW

Short End of the Stick

Editor:

I am addressing an issue that has disturbed me for most of the time I've used the Color Computer: the lack of coverage for Tandy's Color Computer.

RAINBOW Magazine is second to none in the coverage it provides every month. But it is also the only publication I am aware of for the computer. Other computers on the market have many more, although less satisfying, publications supporting them.

If THE RAINBOW printed a chart comparing feature against feature for computers in the CoCo's price range, owners of the other computers would be in for some surprises. IBM needs a CGA adapter to get 16 colors on the screen. My CoCo 3 has that built in. Commodore owners would be interested in loading programs quickly instead of timing their disk drives with a calendar. Atari owners might try to hook up an IBM drive to their computers — CoCo can already do it. Apple owners might be interested in the price of a fully configured CoCo system when they take a look at their IIE. And just try to program a Commodore 64/128 without typing `POKE` every other word.

I'm tired of seeing my Color Computer 3 get the short end of the stick as far as the home computer field is concerned. You have proved that the Color Computer is just as good, if not better, than the other computers in its class. Keep up the good work. Maybe Mr. Roach will take heed.

Kevin McCoy
Hayti, Missouri

HINTS & TIPS

Editor:

I have been a satisfied user of Dennis Derringer's *Pro-Color File* database software for about two years except for one minor problem: leading zeros.

Two evenings ago I had a stroke of luck while working again on this problem. I discovered that leading zeros are not generated while calculating in the update module but are generated in the post/accounts module. A quick listing and comparison of the two modules that are almost identical showed that a 0 was being inserted in Line 810 of Post/Accounts while `CHR$(32)`, a space, was being inserted in Line 1040 of Enter/Update. A simple edit solved my problem and perhaps will solve the problem for other owners of *Pro Color File*.

Next month marks my fifth anniversary reading THE RAINBOW, working on a fully configured CoCo 3, and learning OS-9 and BASIC09. I find it slow going at times but very exciting and rewarding at 60 years of age.

John McKnight
Danvers, Massachusetts

Interesting Poke

Editor:

I have found an interesting poke. Most veteran CoConuts already know about `POKE111,254:DIR`, which sends the directory to the printer. But you can poke that address with other numbers too. Say you have a BASIC program in memory and want to save only lines 80 through 150. You could delete all lines before 80 and after 150 and then save the program, or you could type:

```
OPEN"O",1,"TEST.BAS":POKE111,1:LIST80-
150:CLOSE
```

This opens a file for output, changes the active device number to 1 and then lists the lines to the file. You can do the same thing with cassette output by opening Device Number `-1` and `POKE111,255` (`255` is the signed two's-complement binary 8-bit representation of `-1`). You can do this with the printer (`POKE111,24`), but this serves no purpose as it only duplicates the `LLIST` command. The poke serves the input routine as well as ouput. But the input from the printer results in a End of File Error. Also, attempting to send the directory to a disk file does not work if your directory contains more than eight entries.

Carl England
Calhoun, Georgia

REQUEST HOTLINE

Editor:

I have written concerning Sierra On-Line, Inc. Sierra has accused the CoCo community of the second highest piracy rate. The company has also refused to continue supporting the CoCo unless it gets enough mail to prove that marketing CoCo software is profitable.

I particularly enjoy Sierra software on my Tandy 1000, and I would like to use it as well on my CoCo. Please publish this letter to encourage people to take a few minutes to write to Sierra expressing this concern.

Charles E. Youse
Highlands Lakes, New Jersey

Convincing Sierra

Editor:

I wrote a letter to Sierra concerning the poor quality and support of the CoCo, especially in the ROM pack versions of its games.

Sierra's letter to me stated that Sierra is pulling out of the CoCo. But if enough people show interest and support, it may reconsider the decision. This is very important because if we can get Sierra to fully support the CoCo, others will follow.

Any readers interested in showing their support for the CoCo, please write to Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614.

Scott Amendorlaro
Parsippany, New Jersey

INFORMATION PLEASE

Editor:

Thanks for your information on pages 138 and 139 of THE RAINBOW, June 1989. It really was a big help.

My question is: How can I move the OS-9 side of RAINBOW ON DISK each month to another disk?

I want the directory to be:

```
JAN89
FEB89
MAR89
etc...
```

`JAN89` would contain the OS-9 side of RAINBOW ON DISK for January, etc.

If you could write an article to explain how to do this, I would appreciate it.

Bill Link
Route 1, Box 76
Richfield, NC 28137

To do this, you must first format an OS-9 disk. Use `MAKEDIR` *to create the directories, then load* `dsave`. *Place* RAINBOW ON DISK *in Drive 0 and the "save" disk in Drive 1. Type* `chd/d1` *and* ENTER, *then* `dsave /d0 /d1/`*directory name* `! shell`. *The files will be copied from* RAINBOW ON DISK *to your directories.*

Need Printer Codes

Editor:

First let me say that I have enjoyed your magazine since 1984. I like to put programs in from THE RAINBOW. I have a DMP-130 printer, a CoCo 2 and one disk drive. The problem is that when I enter a program not

CIII Pages

by Walter Bayer

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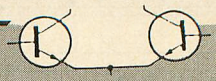

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UPS 2ND DAY AIR

for the DMP-130, the program says to change the printer codes to fit the printer.

I know it is impossible to give the codes to all the printers, but could you publish the printer codes and the meaning of these codes so we can compare and make the proper changes, at least for the most popular printers? I am sure many of your readers would like this information.

Floyd J. Daigle, Sr.
630 Bayon Drive
Pierre Part, LA 70339

See Cray Augsburg's "Printer Diversions and Conversions" (August '88, Page 142) for using the control codes to enhance your printer's capabilities.

Choo-Choo Games?

Editor:

I am a modelrailer and would like to know if anyone knows of any programs or games that can be run on CoCo 2 for model railroading. If so, please contact me.

Allen Galinski
1428 Huron Ave.
Sheboygan, WI 53081

Hi-Res Help

Editor:

I would very much appreciate any help you can offer on the use of the Hi-Res screen dump program by Shane Messer (May '89 issue) on the DMP-106 from Radio Shack.

As he says, the only screen dumps around are for PMODE graphics, which does not suit anyone having the CoCo 3 with all the new colors.

I do not use PMODEs anymore — for one thing there are limited colors and it makes for rather slow animation. The CoCo 3 palette switching improves the speed but is still not fast. Going to machine language is fine, but I do not really care all that much to learn it.

Let me know if there is a disk program I can use. I have a lot of programs I would like to print out.

D. Arcy Brownrigg
P.O. Box 292
Chelsea, PQ J0X 1N0, Canada

The Color Mouse Baffles Me. . .

Editor:

I use 64K Disk Extended Color BASIC CoCo with a DMP-105 printer. I am looking for a program(s) that would enable my CoCo to produce drawn-out electronic schematics and printed circuit board layouts. Can you help me?

I also have a technical question. How does a color mouse work? I know that it has a movable ball on the bottom — but how does that produce any kind of signal being sent to CoCo? I know that other types of mice for other computers consist of light, which has to cross a line/or dot on a pad. But the color mouse baffles me.

I know that the Color Computer's basic joystick consists of two potientiometers, I can see how that might work. Does the joystick send an analog or digital signal to the computer? What about the mouse? Can you tell me anything on how to increase the accuracy for a joystick so it's not so jumpy when using it with programs that produce graphics?

Last of all, I've heard of interfaces or conversion boxes that make Atari joysticks work with the CoCo. Are these any good, and how do they work? I know Atari Joysticks consist of four momentarily contact switches — one for up, down, left and right.

Bryon E. Lawrence
1223 22nd Street
Granite City, IL 62040

KUDOS

Editor:

I have never written to a magazine before, but I had to tell you about one of your wonderful advertisers. I ordered a program from Second City Software in March. The program was mailed out, but our good old postal system managed to slice the disk to shreds. It was returned to Second City Software as undeliverable. This was the last copy in stock. Ed Hathaway wanted to make good on my order. He sent me his original disk and manual to use until Second City could provide my registered copy.

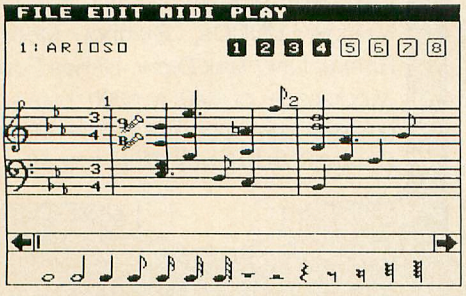
RAINBOWfest was coming up and the company was busy stocking for the show. Time went by without my original program disk. I was happy because I had a working program to use until my original arrived. Three days ago my original program arrived with a letter apologizing for the delay. It was an oversight on Second City's part. To my surprise five complimentary software programs (registered in my name) were also enclosed. If purchased, these programs would have cost me $129.75 plus shipping. Ed also enclosed a check to cover my costs for mailing his disk and manual back to him.

I feel your readers need to know this company will go the extra mile and then some to make its customers happy. When I need new software for my Color Computer 3, Second City Software has my business.

Jo Ann Gass
Beeville, Texas

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.



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SPLIT-SCREEN EDITING

Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

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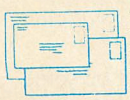

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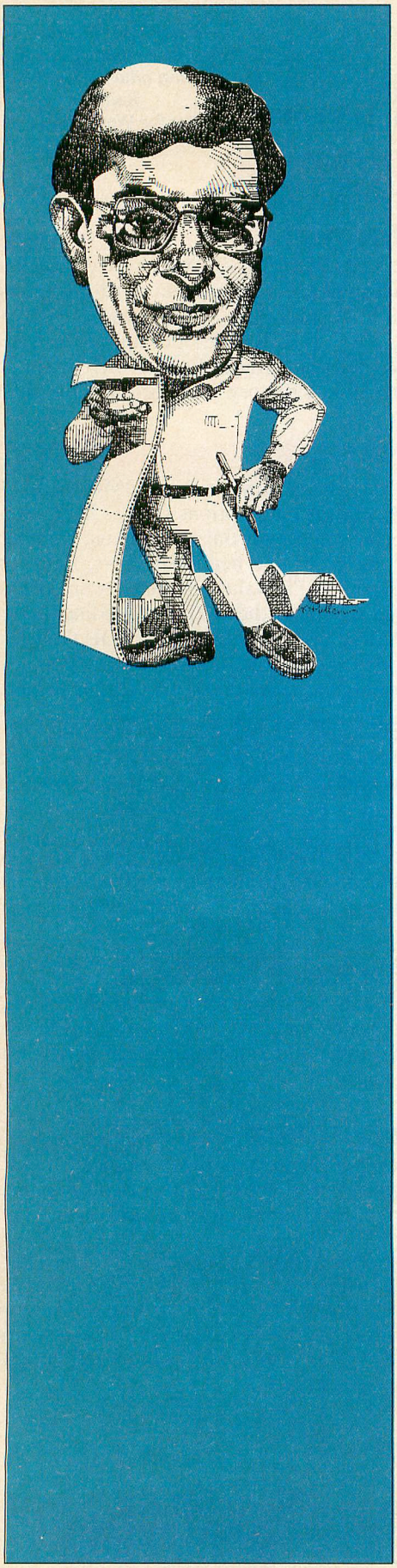

A New Site for RAINBOWfest

One of our more extensive plans for the New Jersey RAINBOWfest, October 20 to 22 of this year, includes a new location for the show.

We are moving to a different hotel, the Hilton in Somerset, for a variety of reasons. First of all, it will be more convenient for most of you, whether you are driving or flying. Secondly, the hotel is nice and has a professional staff — yet it is less expensive than the hotel we have used previously.

A spirit of anticipation is something all of us have when it comes to RAINBOWfest. It is an event we look forward to each year (and for some of us, twice a year) — and there is a real effort by our crew to make it an enjoyable weekend for all of you.

In the last year or two, we found the Hyatt in Princeton (where the show has been held for quite a while now) falling short of its previous performance. Because the Princeton University Homecoming took place at the same time as our convention, most staff members at the hotel preferred attending to the "local festivities" rather than attending to business. RAINBOWfesters had what I think was the poorest service ever (with the exception of the second show in Fort Worth).

Therefore, we scouted the area for better accomodations. Ira Barsky, the RAINBOWfest coordinator, visited the Somerset Hilton just before the show in Princeton last year and gave it a grade of "A" in terms of facilities, management and — most important of all — genuine interest in hosting the CoCo Community.

There are advantages to having the show in the same place each year, assuming things are well-handled. So I did some surveying during the show last year and discovered the problems affecting us were also affecting you. If, towards the end of last year's show, you asked me if we were going to have the show again this year, then you probably heard me say we would — but somewhere else.

My decision was finalized when the Hyatt announced that it was going to charge over $100 a night for a room this year. I find those prices unacceptable.

RAINBOWfest at the Somerset Hilton should be a wonderful time. The hotel has a computer reservation system, which means your reservations (you can make them through POSH Travel in Louisville) are confirmed in a professional and timely manner; it has food you will enjoy at reasonable prices; and, most importantly, the staff is looking forward to having the CoCo Community as hotel guests.

I have not said anything about RAINBOWfest itself — as usual there will be some great booths, exciting new products and excellent seminars. But most important of all, there will be lots of CoCo Community members there.

Join us at RAINBOWfest Somerset. I'm going to have a great time. You will, too!

— Lonnie Falk

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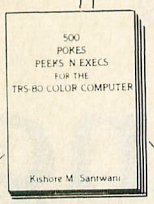

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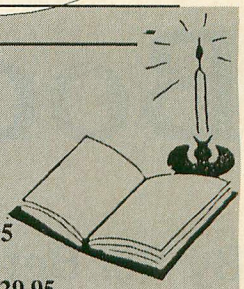

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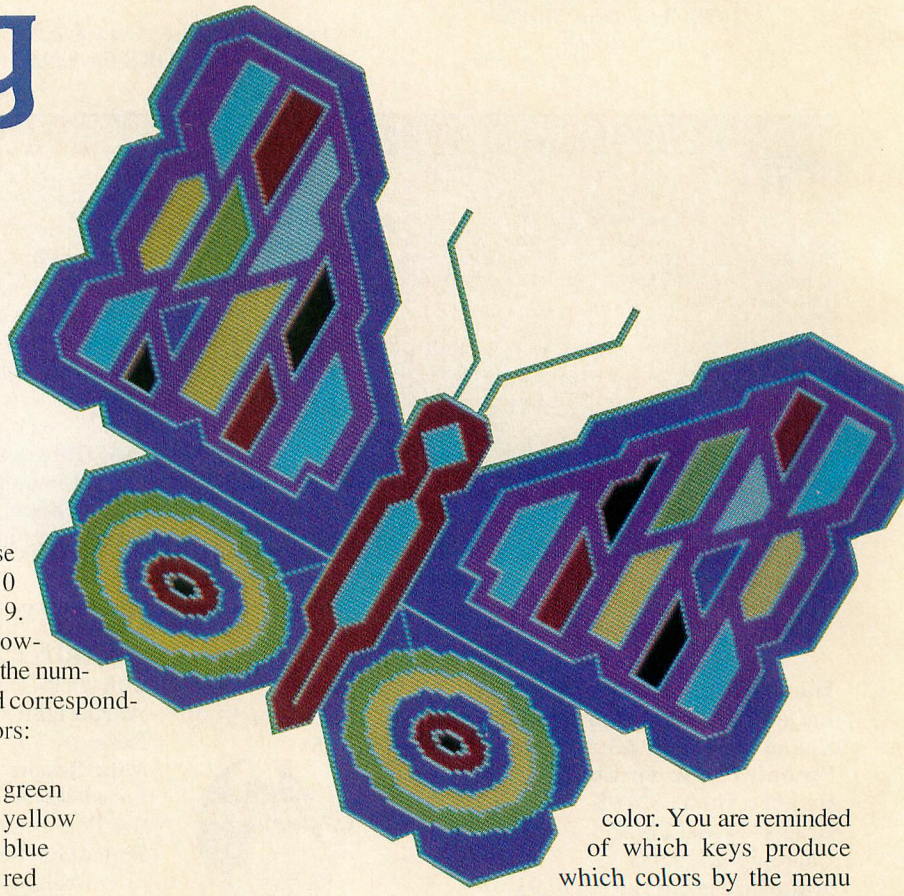
A Rainbow of colors in a flash . . .

The CoCo Coloring Book

By Bill Bernico



I remember, as a kid, how I loved to color in my coloring book. It wasn't so much fun, though, when the pages got torn or the crayons got lost or I got into trouble for coloring on the refrigerator. This program eliminates all these problems and lets kids enjoy coloring pictures with the computer.

The CoCo Coloring Book is a pretty straightforward program and simple to operate, yet fun and interesting enough to keep the youngsters occupied for hours.

Once the title screen appears, you see a prompt to press the space bar to continue. A picture menu appears with eight picture choices. Selecting a picture by pressing the appropriate key causes the computer to switch to a screen showing an outline of a picture. The user's task is to color in the spaces by pressing the color keys, which in this case are keys 0 through 9. The following lists the numbers and corresponding colors:

0 — green
1 — yellow
2 — blue
3 — red
4 — white
5 — light blue
6 — purple
7 — orange
8 — black

The 9 key paints an area with "flash" colors. That is, the painted area alternates all of the other eight colors within its boundaries and remains that way until you paint over it.

Here's how you paint a specified area: Move the flashing cursor with your right joystick. When the cursor is within the boundaries of an area you want to paint, keep it there and hit one of the number keys. That area is painted with the corresponding color. You are reminded of which keys produce which colors by the menu along the right side of the screen. If you paint an area and decide you'd like another color, simply press another color key and it paints over the old one. This works with any color except white. Once you paint an area white, it remains white until you leave the screen and start over.

The only other key with any effect is the M key, which takes you back to the menu screen and lets you either choose another picture to color or press Q to quit. It's that simple.

(Questions or comments concerning this program may be directed to the author at 16721 Lakeshore Road, Cleveland, WI 53015. Please enclose an SASE when requesting a reply.) ❑

Bill Bernico is the author of over 200 Color Computer programs and is a frequent RAINBOW contributor whose hobbies include golf, writing music and programming. Bill is a drummer in a rock band and lives in Sheboygan, Wisconsin.

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The listing: COLRBOOK

```
ø ' COPYRIGHT 1989  FALSOFT,INC
1 'COCO COLORING BOOK (C) 1989
   FROM BILL BERNICO SOFTWARE
2 POKE65497,Ø:HSCREEN2:HCLS4:HCO
LOR8,4:RGB:HBUFF1,5Ø:HBUFF2,7ØØØ
:GOSUB8Ø
3 DIMA$(9Ø),S(15,14):GOSUB4Ø:GOS
UB39:A$="COCO":HDRAW"BM1Ø,4ØS16"
:GOSUB78:A$="COLORING":HDRAW"BM3
Ø,87":GOSUB78:A$="BOOK":HDRAW"BM
5Ø,135":GOSUB78:HPAINT(17,2Ø),3,
4:PLAY"O2T1ØE":HPAINT(39,5Ø),1,4
:PLAY"O2T1ØG
4 HPAINT(62,99),2,4:PLAY"O2T1ØB"
:HPRINT(26,13),"(C) 1989":HPRINT
(24,14),"BILL BERNICO":HPRINT(26
,15),"SOFTWARE":HCOLORØ:HPRINT(9
,22),"<HIT SPACEBAR TO BEGIN>
5 IN$=INKEY$:IFIN$=CHR$(32)THENG
OSUB39:GOTO32ELSE5
6 PALETTE9,RND(63):HGET(O,D)-(O+
1,D+2),1:HPUT(O,D)-(O+1,D+2),1,N
OT:FORX=1TO15:NEXTX:HPUT(O,D)-(O
+1,D+2),1,NOT:O=(JOYSTK(Ø)*4):D=
(JOYSTK(1)*3)
7 Z$=INKEY$:IFZ$<"Ø"ORZ$>"9"THEN
8ELSEHPAINT(O,D),VAL(Z$),4
8 IFZ$="M"THENGOSUB39:GOTO32ELSE
6
9 GOSUB39:A$="ABCEDFGHI":HDRAW"B
MØ,43S16":GOSUB78:A$="JKLMNOPQ":
HDRAW"BMØ,88":GOSUB78:A$="RSTUVW
XYZ":HDRAW"BMØ,136":GOSUB78:A$="
123456789":HDRAW"BMØ,183":GOSUB7
8:GOSUB82:GOTO6
1Ø GOSUB39:HDRAW"S4BM36,44D2L2F2
D7M33,71M32,88M35,99R2D2L2M41,11
3M45,114M54,125D2R1ØM77,131R1ØUR
5M97,136D3M1Ø3,141M1Ø4,139M1Ø9,1
4ØM116,149M124,152U6M126,142M129
,146M13Ø,139R9M141,141R7M145,137
M156,136M16Ø,138M163,136M167,142
D3M171,151D2M173,155
11 HDRAW"M178,153U8M177,143M172,
131M175,126M178,125M179,122M191,
1Ø9M189,99M193,1Ø1M194,99U3R3M2Ø
Ø,89M198,88M199,85M197,83M2Ø7,8Ø
M212,77U2R2DM215,75U2L2UL2U6M22Ø
,64M221,59M218,58U8M215,51M21Ø,4
9M2Ø7,59M2Ø4,6ØL12M181,67L3M174,
71R2D2L2M163,78M168,67
12 HDRAW"U3R2D2R2U2M169,58M159,5
6U7L4U2M147,46M142,49M126,44L9ØB
M36,58M39,59D2M48,6ØR9M57,44D24M
55,6ØM58,71D6BM32,78R43BM49,78D1
8M65,111M67,114M64,117D1ØBM68,78
D3ØL3D3BM62,44D8R2D8M67,61M69,68
R7NU2D16R21U4ØBM75,66R22BM76,84R
29BM84,84D47BM68,1Ø5
13 HDRAW"R59BM1Ø5,84D21BM1Ø2,1Ø5
BM1Ø2,1Ø5D23M92,128BM1Ø2,1Ø8R1ØD
9M119,12ØR12M133,139BM127,1Ø5D2R
2D14BM119,44D6M121,53M118,61NL21
M121,64D14M118,77GM115,77L18BM12
1,77M123,8ØM122,86M125,9ØM127,93
D12BM1Ø5,9ØR2ØBM143,49M136,56D2L
2M134,64M137,75R11DR2
14 HDRAW"BM121,72R14M137,89U13BM
149,75M15Ø,77M151,8ØD4M149,97M14
5,99M143,1Ø2BM137,89M145,1Ø5D3L3
U2L14BM142,1Ø8M137,121DL6BM137,1
21M139,124M138,127M14Ø,132R4M145
,137BM139,114R29BL19M148,136R4U4
R8M158,114BM159,133R9UR4BM173,12
8M168,117DL2M169,113
15 HDRAW"R5DR6BM18Ø,114M183,117B
M144,1Ø7R4UR41BM158,114M16Ø,111R
3M168,1Ø6BM149,97M15Ø,98M153,96R
M16Ø,93U15D13M161,93FM165,94M17Ø
,1Ø2R3M174,98M177,97M178,96M181,
95M187,96M189,1Ø1BM163,1Ø5M168,1
Ø2BM136,55M14Ø,54M144,58R2M148,6
4M151,62M149,68M148,75
16 HDRAW"M148,75BM142,55M15Ø,51M
149,54M152,55M156,53M159,57M155,
58M15Ø,59M149,63BM159,6ØM155,61M
153,67D4M15Ø,77BM157,59M161,61D7
R2U3M165,66M166,71BM15Ø,78R19M17
6,74U3M183,68FBM172,76D16M191,92
M194,93D3BM189,92D3R6BM172,88M16
9,91M164,94
17 HDRAW"BM175,92D4R5BM175,75D4R
13M193,82R4U9R2U12BM192,82M191,8
7M193,88M191,92BM197,75R12M21Ø,7
8BM2Ø5,75D6BM199,7ØM2Ø7,71M21Ø,6
8BM2Ø4,6ØM2Ø5,63M2Ø3,67D4BM2Ø9,5
6M2Ø8,59M2Ø9,67RBM2Ø2,84M2Ø9,82M
21Ø,84M2Ø6,85M2Ø2,84BM126,89R11B
M92,128D2":GOSUB82:GOTO6
18 GOSUB39:HCIRCLE(2Ø,7Ø),15:HCI
RCLE(12Ø,95),5Ø:HDRAW"S4BM45,5R1
5ØD185L15ØU185BM12Ø,5M45,95M12Ø,
19ØM195,95M12Ø,5BM5,5R3ØD3ØL3ØU3
ØBM5,13ØR3ØM2Ø,1Ø5M5,13ØBM13,186
H1ØU13E1ØR13F1ØD13G1ØL13
19 HCIRCLE(23Ø,2Ø),2Ø,,.55:HDRAW
"BM24Ø,84L18M-1Ø,-16M+17,-14M+17
,+13M24Ø,84BM21Ø,1Ø7R4ØD25L4ØU25
":HDRAW"BM228,179NM243,191M21Ø,1
91M217,173M2ØØ,161R19M228,142M23
7,161R19M238,172M244,191":GOSUB8
2:GOTO6
2Ø GOSUB39:S$="G3H3E3F3BR12":HDR
AW"S4BM5,5R1ØØD84L1ØØU84R22ØD12L
12ØD12R12ØD12L12ØD12R12ØD12L12ØD
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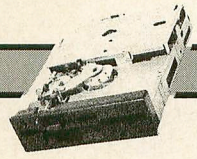

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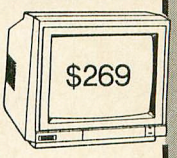

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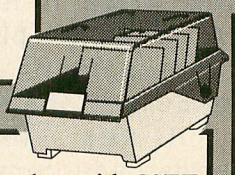

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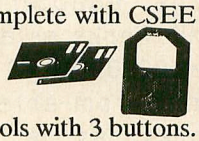

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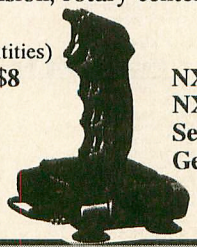

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12R12ØD12L22ØD12R22ØD12L22ØD12R2
2ØD12L22ØD12R22ØD12L22ØU156R22ØD
156":HDRAW"BM16,13":FORX=1TO8:HD
RAWS$:NEXT:HDRAW"BM16,26":FORX=1
TO8:HDRAWS$:NEXT
21 HDRAW"BM16,39":FORX=1TO8:HDRA
WS$:NEXT:HDRAW"BM16,52":FORX=1TO
8:HDRAWS$:NEXT:HDRAW"BM16,65":FO
RX=1TO8:HDRAWS$:NEXT:HDRAW"BM16,
78":FORX=1TO8:HDRAWS$:NEXT:A$="1
958  U.S.  FLAG":HDRAW"BM1Ø,189S
8":GOSUB78:GOSUB82:GOTO6
22 GOSUB39:HCIRCLE(128,96),97:HC
IRCLE(128,96),91:HCIRCLE(128,96)
,5:HDRAW"S8BM159,44"+A$(49)+"BM1
85,69"+A$(5Ø)+"BM2ØØ,1Ø5"+A$(51)
:HDRAW"BM186,141"+A$(52)+"BM16Ø,
169"+A$(53):HDRAW"BM12Ø,182"+A$(
54)+"BM8Ø,169"+A$(55):HDRAW"BM51
,141"+A$(56)
23 HDRAW"BM4Ø,1Ø7"+A$(57)+"BM47,
74"+A$(49)+A$(79):HDRAW"BM73,45"
+A$(49)+A$(49):HDRAW"BM114,3Ø"+A
$(49)+A$(5Ø):HDRAW"BM128,96U6M64
,41M112,92M128,96E4R25M139,1Ø3M1
28,96":GOSUB82:GOTO6
24 GOSUB39:FORX=ØTO19ØSTEP1Ø:HLI
NE(Ø,X)-(25Ø,X),PSET:NEXTX:FORX=
ØTO25ØSTEP1Ø:HLINE(X,Ø)-(X,19Ø),
PSET:NEXTX:GOSUB82:GOTO6
25 GOSUB39:FORJ=ØTO15:S(J,13)=S(
J,13)+16:NEXTJ:K=Ø:FORJ=ØTO15:K=
K+S(J,13):NEXTJ:FORJ=ØTO15:S(J,1
4)=S(J,13)/K:NEXTJ:X=128:Y=96:F=
Ø:FORV=6TO96STEP1Ø:HCIRCLE(X,Y),
V:NEXTV:FORJ=ØTO14:F=F+S(J,14):H
LINE(X,Y)-(X+1ØØ*COS(6.283*S),Y+
1ØØ*SIN(6.283*S)),PSET
26 HLINE(X,Y)-(X+96*COS(6.283*F)
,Y+96*SIN(6.283*F)),PSET:NEXTJ:G
OSUB82:GOTO6
27 GOSUB39:HDRAW"S4BM128,72R4F4D
12G4F4D34G4D18G6H6U18H4U34E4H4U1
2E4R7BM136,84E18U6E18U6E18R3ØF1Ø
D2ØG6F6D2ØG6F6D2ØG6L16H4G4L14NL5
ØF12D8G4F4D8G12L14H4G4L14H17BL14
G16L14H4G4L14H12U8E4H4U8E12NR48
28 HDRAW"L14H4G4L16H6U2ØE6H6U2ØE
6H6U2ØE1ØR3ØF18D6F18D8F16BR8BU12
U1ØH2ØU8BM13Ø,72U1ØE2ØU8BM144,84
E2ØU4E2ØU4E1ØR24F4D2ØG4F4D24G4F4
D16G4L3ØH4G4L3ØU6L6U2ØBL36H15U5H
18U7H16L24G6D18F6G4D22F6G6D14"
29 HDRAW"F4R32E4F4R26U6R7U19BR12
BU2E6F6G6NH6D8F4D26G4ND2ØH4U26E4
":FORX=1TO25STEP6:HCIRCLE(164,14
Ø),4+X,4,.7:HCIRCLE(88,14Ø),4+X,
4,.7:NEXTX
3Ø HDRAW"BM16Ø,1Ø6U3ØG1ØD14R4D6R
5BR7R8U16H8ND24BU6NF8U6E4U4E4ND2
```


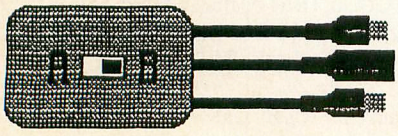

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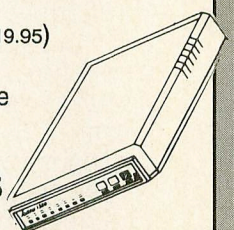

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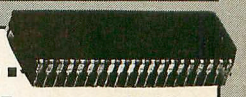

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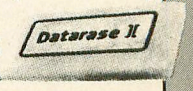

2764 Eprom: $8 **27128 Eprom: $9**
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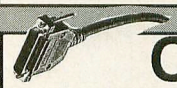

Magnavox 8505/8515/8CM643 Analog RGB Cable: $24.95
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```
5BE6E8D24G8NU24BD6NE8D2ØR8NU28BR
6BD4R8U14H8ND22BU6F8U2ØG8ND4BU6E
8U4H8ND19BU6F8U2ØL8ND12BR14R8D18
G8NU26BD6E4F4D16G4H4NU16BD6F8D14
L8U22"
31 HDRAW"BM136,118NF1ØBL2ØG1ØBM1
Ø2,86D14L4D6L6U3ØNF1ØD3ØBL6L8U22
F8ND14BU6H8U2ØF8ND19BH12H4U1ØH6D
36E1ØNU6BD6NG9D36L1ØU26BM5Ø,28R1
ØD28H1ØNU18BD6F1ØD1ØG1ØNU3ØBD6E8
D16H8BD6F8D4L8NU12BL4L8U14E8ND22
BU6G4H4U18E4F4ND18BU6H8U18R8D26"
:GOSUB82:GOTO6
32 GOSUB39:A$="1. ALPHABET":HDRA
W"S8BMØ,2Ø":GOSUB78:A$="2. U.S.
MAP":HDRAW"BMØ,43":GOSUB78:A$="3
. ODD SHAPES":HDRAW"BMØ,66":GOSU
B78:A$="4. 48 STAR FLAG":HDRAW"B
MØ,89":GOSUB78:A$="5. CLOCK FACE
":HDRAW"BMØ,112":GOSUB78:A$="6.
SQUARES
33 HDRAW"BMØ,135":GOSUB78:A$="7.
 SPIDER WEB":HDRAW"BMØ,158":GOSU
B78:A$="8. BUTTERFLY":HDRAW"BMØ,
181":GOSUB78:HPRINT(27,21),"Pick
 (1-8)":HPRINT(27,22),"Q to Quit
34 Z$=INKEY$:IFZ$=""THEN34
35 IFZ$="Q"THEN38
36 A=VAL(Z$):IF A<1 OR A>8 THEN3
4
37 ON A GOTO 9,1Ø,18,2Ø,22,24,25
,27
38 WIDTH32:RGB:POKE65496,Ø:END
39 HSCREEN2:HCLS8:HCOLOR4,8:RETU
RN
4Ø A$(65)="BR7L2U3NL2BU2U2HGD2NR
2BD2D3L2U8E2R2F2D8
41 A$(66)="BRNR5U1ØR5FD3BL2L2U2R
2D2BR2GFBL2L2D2R2U2BR2D3GBR
42 A$(67)="BR6L4HU8ER4FD2L2UL2D6
R2UR2D2GBR
43 A$(68)="BRNR5U1ØR5FDBL2L2D6R2
U6BR2D7GBR
44 A$(69)="BRNR6U1ØR6D2L4D2R2D2L
2D2R4D2
45 A$(7Ø)="BRNR2U1ØR6D2L4D2R2D2L
2D4BR4
46 A$(71)="BR2NR5HU8ER4FD2L2UL2D
6R2U2LUR3D5
47 A$(72)="BR7L2U4L2D4L2U1ØR2D4R
2U4R2D1Ø
48 A$(73)="BR7L6U2R2U6L2U2R6D2L2
D6R2D2
49 A$(74)="BR4L3HU2R2DRU6L2U2R6D
2L2D7GBR2
5Ø A$(75)="BR8H4D4L2U1ØR2D4E4R2G
5F5L2BR3
51 A$(76)="BR7L6U1ØR2D8R4D2
52 A$(77)="BR9L2U7G2H2D7L2U1ØR2F
2E2R2D1Ø
53 A$(78)="BR8L2U4H3D7L2U1ØR2F3U
3R2D1Ø
54 A$(79)="BR6L4HU8ER4FDBL2D6L2U
6R2BR2D7GBR
55 A$(8Ø)="BR3L2U1ØR5FDBL2D2L2U2
R2BR2D3GL3D4BR4
56 A$(81)="BR5L3HU8ER4FDBL2L2D6R
URU5BR2D6FDGLHBR2
57 A$(82)="BR7L2U2H2D4L2U1ØR5FDB
L2D2L2U2R2BR2D2GL2F3D2
58 A$(83)="BR6L4HU2R2DR2U2L3HU4E
R4FD2L2UL2D2R3FD4GBR
59 A$(84)="BR5L2U8L2U2R6D2L2D8BR
2
6Ø A$(85)="BR6L4HU9R2D8R2U8R2D9G
BR
61 A$(86)="BR4H3U7R2D6FEU6R2D7G3
BR3
62 A$(87)="BR9L2H2G2L2U1ØR2D7E2F
2U7R2D1Ø
63 A$(88)="BR7L2U3HGD3L2U3E2H2U3
R2D3FEU3R2D3G2F2D3
64 A$(89)="BR5L2U4H2U4R2D3FEU3R2
D4G2D4BR2
65 A$(9Ø)="BR7L6U3E4UL4U2R6D4G3D
R3D2
66 A$(45)="BR8BU4L5U2R5D2BD4BR2
67 A$(46)="BR2RULDBR2
68 A$(49)="BR6L4U2RU6LUER2D8RD2
69 A$(5Ø)="BR7L6U3E4UL2DL2U2ER4F
D3G4R4D2
7Ø A$(51)="BR6L4HU2R2DR2UHUEU2L2
DL2U2ER4FD3GFD3GBR
71 A$(52)="BR7L2U4L4U6R2D4R2U4R2
D4RD2LD4
72 A$(53)="BR6L4HU2R2DR2U3L4U5R6
D2L4DR3FD5GBR
73 A$(54)="BR6L4HU8ER4FD2L2UL2D2
R3FDBL2L2D2R2U2BR2D3GBR
74 A$(55)="BR3L2U3E4UL4U2R6D4G4D
2BR4
75 A$(56)="BR6L4HU3EHU3ER4FDBL2D
2L2U2R2BR2D2GFBL2L2D2R2U2BR2D3GB
R
76 A$(57)="BR6L4HU2R2DR2U2BU2U2L
2D2R2BD2L3HU4ER4FD8GBR
77 A$(32)="BR6":RETURN
78 FORX=1TOLEN(A$):Y=ASC(MID$(A$
,X,1)):HDRAWA$(Y):EXEC43345:NEXT
:RETURN
79 IFINKEY$<>CHR$(32)THEN79ELSER
ETURN
8Ø HSCREEN2:HCLS4:HCOLOR8,4:HPRI
NT(33,1),"M=Menu":HPRINT(34,3),"
COLOR":HPRINT(34,4),"KEYS":FORH=
6TO15:HPRINT(32,H),H-6:HPRINT(34
,H),"=":NEXTH:HDRAW"BM28Ø,48":FO
RJ=1TO1Ø:HDRAW"NR39D8"
81 NEXT:HDRAW"R39":W=49:FORP=ØTO
8:HPAINT(281,W),P,8:W=W+8:NEXTP:
HDRAW"BM284,126U4NR3D2NR2D2BR6NU
4R3BR4U4R3D2NL3D2BR4R3U2L3U2R3BR
4D4U2R3U2D4":HGET(263,Ø)-(319,19
1),2:RETURN
82 HPUT(263,Ø)-(319,191),2:RETUR
N
```

3 Fabulous Bargains!

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Max-10: the Rolls-Royce of word processors. The only one with true graphic capability and dozens of type styles. Using your dot matrix printer you get from tiny footnotes (6 point) to big titles (24 point).

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CoCo Max III: now a classic and probably the most popular CoCo program ever. If the price was the reason that stopped you before, this *special* will delight you. Listen (*Rainbow* 3/88): **"There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. CoCo Max III is the ultimate program for the CoCo 3."** Check any Rainbow (up to 4/89) for complete info on CoCo Max.

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We swear that Max-10 will add excitement to your word processing, and that's no small task!

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NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
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System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack or Colorware Hi-Res Pack;a video or RGB monitor or a TV.

About CoCo Max III

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Perlman and his computer are back in action

The Do-It-Yourself Disk Database, Part 3

By Richard Perlman

This is the third article in a series explaining how you can create and use a full-featured disk database system, even if you're not an expert. The first two articles in the series appeared in the February and March issues of THE RAINBOW. Since that time the computer and I have been out of action, but the team is now back and ready to continue.

I left off in the midst of creating a database that helps manage money. As I go along, you'll see that with some minor changes you can use this database to keep track of almost anything.

If you have been following from the beginning, you are no longer a beginning programmer. This article contains an in-depth look at the program, and you should have no trouble following it. You can skip the next few paragraphs and begin reading at "Where We Left Off." For the rest of you, I review the highlights of the earlier articles. This should be enough to allow you to continue as I go through the code. But for a really good understanding, refer to the earlier articles.

Richard Perlman spends his time at work helping others use their PCs. At home he shares his CoCo 2 with his wife and two children.

Important BASIC Statements to Know

If you are uncomfortable using GOSUB, RETURN, GOTO, ON GOSUB and ON GOTO, take time now to familiarize yourself with them. I use a lot of subroutines and computed GOTOs in the system because it makes the programs easier to code and faster to run. You will have problems following the program unless you know how these statements work. Other important statements include VAL, CHR$, MID$, LEFT$, RIGHT$, +, FOR-NEXT, DIM and the display statements PRINT, PRINT @ and PRINT...;. All these statements are described in detail in the earlier articles, including examples of how to use them.

Other Background Information

I explained that *database* is not a mysterious term reserved for use by computer gurus but simply a collection of information organized according to a set of rules. In the computerized database these rules are built into both programs and data records. I wrote the rules about what my data records would look like in a Data Dictionary, which I used as a blueprint for the system (see the March '89 RAINBOW, Page 89). The rules state that each record in the database contains information in the format shown in the Data Dictionary. They also specify that the records are placed on the disk (filed) in a specific order, according to the values of their "keys." I defined the key as the first nine characters of each record.

According to the Data Dictionary, the first four characters contain the date (MMDD). The database is therefore said to be in date sequence. It consists of 24 data files, two for each month. The program CREATE

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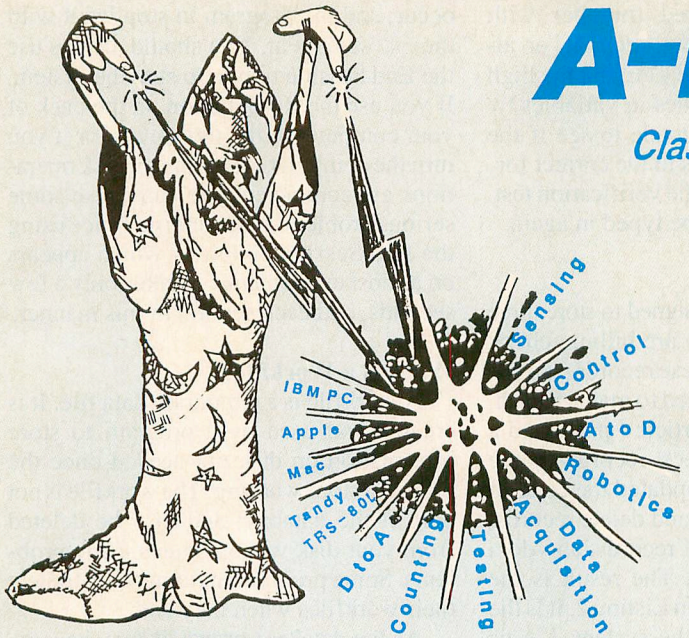

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Founded in 1976 for the purpose of developing low cost I/O devices for personal computers, Alpha has grown to serve over 70000 customers in over 60 countries. A-BUS users include many of the Fortune 500 (IBM, Hewlett-Packard, Tandy, Bell Labs, GM...) as well as most major universities. A-BUS products are U.S. designed, U.S. built, and serviced worldwide.
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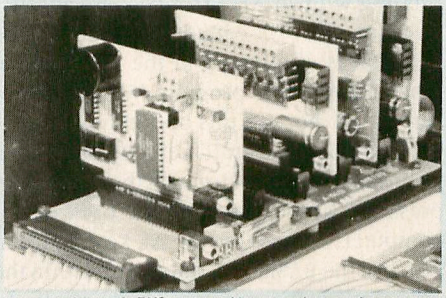

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(shown in Listing 1) creates an empty database for your use. Caution: It also removes all data from an existing database. Use it with care!

I wanted the database to be reasonably fast, easy to program and use, and difficult to mess up. To make it fast, I used a computerized index, much like the index in a textbook. The index tells me which file of the 24 to use when I want to add, change or delete a record. In this manner a lot of time is saved because I process only 1/24th of the entire database when I do an update.

To make it easy, I stuck to BASIC and used sequential files. There are no elegant programming schemes, no assembly language subroutines, no complicated disk Input/Output statements, and no PEEKs and POKEs. Using subroutines makes smaller programs that are less difficult to write and to follow. I gave examples of how subroutines can be used to create menus, to input and verify data, and to create and update the disk database.

To make errors difficult, I used the menu selection process to direct each operation. There is no need to remember special input codes or key sequences. I also check every piece of information I type in before it is added to the system. If it is a number, I check for its specific range. If it is a dollar value, I check for a decimal point followed by two numbers. If it is a name, address or character string, I check to see that it does not exceed a certain length. As a final control, each transaction goes through a Final OK procedure. The database cannot be changed until you give this Final OK.

Programming the Menu Subroutine

Since selecting options from a menu is so important, I programmed a subroutine to do it. The MENU subroutine of ADDRECRD (March 1989, Page 92) begins on Line 9000. I place the lines I want displayed into the LI$ array, the number of choices in the NL variable, and the starting location of the first line to be displayed into SL. The subroutine then allows a choice by typing any number between 1 and the number in NL. This value is put into Variable A, which is used to control where I go after the subroutine returns control to the program.

The Data Input and Verify Subroutine

I check each data item entered with the subroutine at Line 9020. This subroutine controls the entry of all information. It allows me to place messages requesting input on any line of the screen, to input the data, and to redo the input if the information is not in range. Before I call this subroutine, I must place the message in Variable P$; the starting line of the message display in Variable SL; a code for the type of information expected (number with decimal, number without decimal, or alphanumeric) in Variable VT$; and the high and low acceptable values in variables HV and LV. A test is then made to see if the information just input is in the correct format. If it does not pass the verification test, it is rejected and must be typed in again.

Where We Left Off

The database was designed to store three types of records. These are billing, check and deposit records. These records provide all the information needed to manage cash. At the end of the last article I presented a program that adds check records to the database. I have since updated the code so it now can add, change and delete records, process bill and deposit records, and do a few other good things. The result is the program DATAB, shown in Listing 2. It is the complete front-end to the system. Let us see how it works by following the code as I add a check record.

When I run the program, the first menu I see is Menu a. To find it in the program, look at Line 140. All menus are identified by lowercase letters in the upper-right corner. Menu a is the starting point of the system. I begin and stop every system operation from this menu. The six numbered options on this menu allow adding, changing and deleting information; changing the workfile drive; retrieving information already on the database; or ending the session.

Menu a Options

On this menu, as on other menus, Option 5 is Retrieve Information. The program allows choosing it, but the option does nothing. When it is chosen, control goes to Line 350 where the program stops running with an NE Error because another program, RETRV, cannot be found. This problem is eliminated in the next article, when the *Retrieve* program (RETRV) is presented. Do not use this option now.

There are several methods to stop a program. You can turn off the computer, press the Reset button on the back of the computer, or press the BREAK key. You can also use the BASIC END statement within the program so the program stops itself. In most cases it doesn't make any difference which method you choose, but for the database system it is most important that you let the program stop itself. This option can be selected only when all disk operations are completed. To make it quick and easy to stop the program, there is an End Session option on many of the menus.

Selecting the End Session option on any menu sends the program to Line 230, which causes a message to display, a pause to occur, and the program to stop itself with the END statement. You should always use the End Session option to stop the system. If you use the Reset button on the back of your computer or the BREAK key or if you turn the computer off before all disk operations are completed, you can cause some serious problems on your disk. Since using the End Session option — which appears on almost every menu — takes only a few seconds, end each session in this manner.

What Is a Workfile?

A workfile is a temporary data file. It is created and used by a program to store information on disk not needed once the program stops working. The workfile is not part of the database and may be deleted from your disk without causing any problems. Some programs automatically delete their workfiles when they end.

As the database grows, it may become too large to share its disk space with the workfile. One solution is to place the workfile on another disk drive. If you have a second one, you can place the workfile there. If not, there are other techniques you can use, which I will discuss in the next article. In order to place the workfile on the second drive, use Option 4 on Menu a.

You can use Option 4 at any time. When you do, the program performs a GOTO to Line 270, gives you two choices for the location of the workfile (Drive 0 or Drive 1), and displays the current choice. Depending upon your choice, the variable WF$ has a value of 0 or 1. This is where the program holds the drive number for the workfile. Note that Line 110 sets this initially to 0, so you don't have to use Option 4 at all if you don't need to.

Using a Workfile

As I previously told you, the disk controller is a clever little gizmo that takes care of all the nitty-gritty things involved with reading and writing disk records and files. However, there is a limit to its knowledge; the disk controller simply does not know how to add, change or delete records on the database and has no idea about what is in the Data Dictionary. What I need is a procedure in the program that controls the controller.

The procedure first locates the database file to be changed. It then reads and processes the existing records of the database file. For each record processed, something happens to the workfile:

- The existing record is written to the workfile.
- The existing record is changed and then written to the workfile.

• The existing record is deleted by writing nothing to the workfile.

• A new record is added to the workfile from the information you just typed in.

When I have completed everything, the workfile contains all of the information originally in the database file plus all of the changes I wanted to make. In the final step, I replace the database file with a copy of the workfile and the update is completed.

The workfile is created by the subroutine 9200, which also opens the database file to be changed. Using the month and day provided by the program (`MM$ + DD$`), it constructs the name of the database file to be opened in Variable `SG$`. It opens this file on Line 9220 and assigns it the buffer number 1. It also opens the workfile, which is always named `WORK.CHK`, and assigns it the buffer number 2. Part of the statement that opens the workfile adds the value in Variable `WF$` to the end of the filename to include the drive number selected.

The Update subroutine that uses the workfile begins at Line 9230. It reads from the database file (`INPUT #1` through Line 9240) and writes to the workfile (`WRITE#2` through Line 9250) until the change is made and the end of the database file is reached. At this point control goes to Line 9290 where the workfile is exchanged for the database file.

More Details About Adding a Record

I can add check, deposit or bill records. The method for each is about the same, so I am following the flow in the adding of a check record to show you how the program works. I started at Menu a on Line 140 and chose Option 1. This choice is made in subroutine 9000, which is called by Line 210. The result is that the value 1 is placed into Variable `A`. When I have returned from the 9000 subroutine on Line 220, the `ON GOTO` command directs control to Line 360, which is the start of the Add section. The `UPDATE` subroutine 9230, which I use briefly, adds, changes or deletes records, depending upon the value it finds in Variable `AD`. So on Line 370 I set Variable `AD` to 1. This tells the update subroutine I will be using it to add a record.

I then work with Menu e, which allows me to tell the program whether I am adding a check, bill or deposit record. When I indicate I am adding a check the program directs me to Line 500, where information is entered. Line 510 is a series of `GOSUB`s followed by a `GOTO`. Each `GOSUB` results in the adding of a different item of information, and the `GOTO 630` gets the final item. I need six items of information to complete a check record.

Why Use Small Subroutines?

This code has a lot of `GOSUB`s, and each subroutine is no more than two or three lines long. The reason for this is to save lines of code. I enter many of the same data items whether I am adding a check, bill or deposit, and I may want to reenter an item if I made a mistake. Placing each type of data entry in a subroutine saves a lot of coding.

The Final Review

When I have entered the last item needed to complete the record, the program makes us review the information by calling the Final OK subroutine 9500 from Line 650. This 9500 subroutine actually begins at Line 9520, but can be entered either at 9500 (if you are adding a check or bill) or 9510 (if adding a deposit).

The subroutine forces you to take some action before the program goes any further. Either press Y to indicate all the information is correct, or type in the identifying number of any item you want to change. The choice is presented by a blinking display, alternating between inverted and non-inverted (dark against light background vs. light against dark background) characters. As you are aware, the CoCos 1 and 2 do not have a true lowercase non-graphics display and use inverse characters. They do not invert spaces, so I fudged a little to display an entire line with a dark background. The display in question is shown on Line 9580 (`PRINT @32,PM$`). Variable `PM$` is initialized in Line 120, and the spaces are converted to dark background in Line 130. Note that the dark-background space character is a `CHR$(128)`. I thought this blinking display was sort of nifty — it really gets your attention. CoCo 3 users may change this to suit their visual preference or leave it as is — it won't change the way the program runs.

To get past the blinking display, you need to make a correct response. Once you have replied, the subroutine returns you to Line 600. If you typed an item number, you get to enter that item again. When you press Y, control goes to Line 690. The program proceeds to Line 690 where two alphanumeric variables are created. The first `OK$` is the key of the output record. The second `WR$` is the entire output record. I then proceed to Line 720 where I call the subroutine 9200, which opens the correct database file and workfile and then calls the `UPDATE` subroutine 9230.

The `UPDATE` subroutine must now find the correct place in the file to add the check record. The records on the file are written so each has a higher key than the one before. The subroutine therefore reads records from the database file until it finds

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the first one with a key higher than that of the key of the record I want to add. It has then found the exact spot in the file where the new record is to be placed. Note that the first statement at 9230 is not an INPUT but an EOF check, and there is a very good reason for this. If you attempt to read past the end-of-file, the program stops dead in its tracks. The EOF tests to see whether the end-of-file has been reached and stops you from reading any further. I explain later more about the end-of-file.

On Line 9240 I input a record to Variable LI$ and put its key in Variable IK$. As long as OK$, the key of the record I want to add, is greater than IK$, the key of the record I just read, I add the LI$ record into the workfile (Buffer #2) and read the next record. Once this condition no longer occurs, I go to 9310. The key IK$ must now be greater than OK$ or I have an error condition. I can then write the WR$ record to the workfile, set the record-added indicator RA to 1, write the LI$ record to the workfile, then go back to 9230 to read the remaining records on the database file and write them to the workfile.

End-of-File

I have to transfer all the database file to the workfile and insert the new check record in the correct sequence on the workfile. This means I must read the entire database file. After I read the last record, I still have work to do — the new record may not yet have been added. When EOF is reached, control goes to Line 9270. If the record I want to add has already been added, RA has been set to 1 and control goes to Line 9290. This is where I should be if all has gone well. The database file SG$ is replaced by the workfile, GE is set to 1, and I return to Line 730. However, if the record is not yet added, RA equals zero and the next statement on Line 9270 is run. The only way I can find myself here is if the record to be added has a higher key than any record found on the file. The WR$ record must then be the new last record on the file, so I add it. Then I exchange files, set GE to 1, and press ENTER as before. Otherwise the program goes to Line 9300, which means all is not well.

More Control and Security

If I find IK$ and OK$ are equal, I have another problem. It means a record already exists with the key I am trying to add. I then have duplicate record keys on the file, which makes the data unusable. The program stops the user from doing this. I find myself on Statement 9320, where the value of 1 in AD sends me to Statement 9300. To indicate that I did not have a "good" ending, I place the value of 2 into GE. Then, instead of exchanging the workfile with the database file, I leave all files as they are, close them all, and press ENTER. On returning I go to Statement 730, where the value of 2 in GE causes an error message to print. At this point I can take one of the choices on Menu d.

Is It Foolproof?

Whenever a program is supposed to do something vital for future operation, it is a good idea to put in some sort of check routine. But there can always be something I hadn't thought of or decided to ignore. This is a very good control system but not perfect. By using a lot of computed GOTOs, I created a subroutine that adds, changes and deletes the three record types and also performs error detection in 15 lines of code. But it is not a complete safeguard because it doesn't stop you from entering a duplicate check number on different dates. This isn't a serious problem because in the real world you can do the same thing, and you simply change the information in your checkbook once you notice the problem.

I tried several different solutions to this problem. In all cases the program becomes more complicated, especially in the coding involved with changing and deleting records. It takes longer to add, change and delete records. The program becomes large enough to strain the limits of the 64K memory size. I also had to use additional disk space to keep a separate record of the numbers already used, which meant there was less space for the database. Since the cure is worse than the disease, I left the problem alone. But if you must have the program check against duplicate numbers, I'll give you some ideas in the next article.

What Next?

When I am finished with the attempt to add a record, I am on Line 730, Menu d. This is the case whether or not the record is really added. A different message is displayed depending upon the value in GE, and I continue by making a choice to add more information, return to the first menu, or stop the program.

How About Bills and Deposits?

The method of adding a bill or deposit is almost the same as adding a check. The difference is that other information is needed for these records. I must therefore use different data entry statements to get it into the program. If I select "bill" or "deposit" in Menu e, I am sent to Line 600 to add a deposit and to Line 800 to add a bill. I go through the same information check and record-add coding as before and am returned either GE=1 for a good ending or GE=2 for a bad one.

How Do I Change and Delete?

These options are also under menu control. The program asks for enough information to build the key, then attempts to match keys with an existing record. When a matching record is found, I have several choices. I can examine the record or change as many data items as needed as many times as I like. If I don't want to continue, I can stop without changing or deleting the record. Next I must give the final OK.

In many ways the procedure is very much like adding a record. A workfile is created and records are read from the database and written to the workfile until the selected record is found. If I am changing, the record is changed and written to the workfile. If I am deleting, I simply do not write the record to the workfile. Let's follow this in the program as I change a bill.

The Details of Changing a Record

Starting with Menu a, I select Item 2=Change. This puts me on Line 1800, where the AD indicator is set to 2, signifying "change." In this example I indicate that I am changing a bill, which puts a B in the key I am building and puts the word "BILL" into the variable DV$. Then I go to Line 1920, where the additional information to define the key is gathered. Again I call the OPEN subroutine 9200 and the UPDATE subroutine 9230. If the record is found, the UPDATE subroutine returns a value of 1 in GE. The entire record to be changed is in Variable LI$. All the records in the database file that have been read up to this point have also been written to the workfile. Now I am on Line 2020 and see Menu j.

Can the Key Be Changed?

From Menu j I can use Options 1 through 4 to change any of four data items. However, none of them are part of the record's key. Changing a data item in an existing record does not change the position of the record in the database. Changing the key means changing the position of the record in the database, which is a much more complicated procedure. It requires both deleting the record with the old key and adding the record with the changed key in its new location. The level of complexity further increases if the changed key is of a lower value than the existing key or if more than one database file is involved. For these reasons the program has not been designed to allow for changes in the key. Please note that since add-record and delete-record capability is already built into the program, you can change the key of a record — but you have to do it in two steps.

How Data Is Changed

Options 5, 6 and 7 give me complete

control over the change procedure. If I want to look at the current status of the record, I use Option 5. I have written a subroutine to help examine the record. If I have chosen the wrong record, I can start all over again with Option 6. If I am ready to make the change, I use Option 7. I can also signal that I am ready to make the change from Menu m, which is displayed when Option 5 is chosen. I can change the same item again if necessary and can use Option 5 to look at the record again after I change it. Each time I change information, the LI$ record is updated.

When the Database Is Actually Changed

The changed record is not written to the workfile until I am finally ready to make the change. When I am, control goes to Line 2390, where the updated LI$ record is written to the workfile and RA is set to 1. Then the 9230 subroutine is called again. As in "add", once RA is set to 1, all records read from the database file are written to the workfile. At the end-of-file I go to Line 9270 where the value of 1 in RA sends me to 9290, which is the place to be for a successful update. Upon return, I go to 2420 with GE=1. If a match on the key cannot be made, GE is set to 2; upon return the test of GE on Line 2010 sends me to Line 2420, and no change is made.

Deleting

Similar to the way the Change coding works, the program requests enough information to build the key of the record I want to delete. It then sets AD to 3 and calls the OPEN and UPDATE subroutines. When a match with an existing key is found, I have the option of deleting it immediately, examining the record to make sure it is the one I really want to delete, or returning to the previous menu without deleting anything. Once I give the final OK that I really do want to get rid of the miserable record, RA is set to 1 and I recall the update subroutine. Nothing is written to the workfile.

When the end-of-file is reached, the entire database file, less the deleted record, has been written to the workfile. I exchange the workfile for the database file and the deletion has been completed.

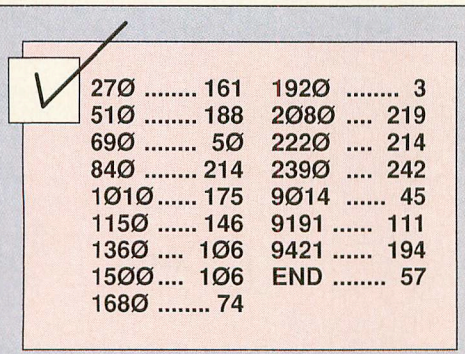
That's All, Folks!

As Mel Allen used to say, "How about that?" I have created the database and can add, change and delete three types of records to it. In the next article I show how to get information out by using an "Output Writer," explain how you can change the system to suit your special needs, and give you some ideas about using cassettes and other database packages.

(Questions or comments about this tutorial may be directed to the author at 83-34 169 St., Jamaica, NY 11432. Please include an SASE when requesting a reply.)❑

Listing 1: CREATE

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1ØØØ CLS
1Ø1Ø PRINT "======= CREATE DATAB
ASE ======="
1Ø2Ø PRINT "24 FILES WILL BE PUT
 ON THE DISK";
1Ø3Ø PRINT "IN DRIVE Ø - MAKE IT
 READY, THEN";
1Ø4Ø PRINT "*** PRESS ANY KEY TO
 CONTINUE
1Ø5Ø A$=INKEY$:IF A$="" GOTO 1Ø5
Ø
9ØØØ FOR I=1Ø1 TO 112
9ØØ2 FOR J=1 TO 2
9ØØ MM$ = RIGHT$(STR$(I),2)
9Ø1Ø IF J > 1 THEN DF$ = "15" EL
SE DF$ = "Ø1
9Ø2Ø SG$= "M"+ MM$+ "D"+ DF$+ "/
CHK"
9Ø3Ø OPEN "O",#1,SG$
9Ø4Ø CLOSE
9Ø5Ø IF DF$="Ø1" THEN PRINT "CRE
ATED ";SG$;"   ";
9Ø6Ø IF DF$="15" THEN PRINT SG$
9Ø7Ø NEXT J
9Ø8Ø NEXT I
9Ø9Ø PRINT "+++ CREATION COMPLET
ED
```



Listing 2: DATAB

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
1ØØ FILES 3,1ØØØ
11Ø CLEAR 75Ø:DIM LI$(7):SS$=CHR
$(127):WF$="Ø"
12Ø PM$=" or type item number to
 change  "
13Ø FOR I=1 TO 32:IF MID$(PM$,I,
1) <> " " THEN NEXT I ELSE MID$(
PM$,I,1)=CHR$(128):NEXT I
14Ø CLSØ:PRINT @Ø,"--- MONEY MAN
AGER DATA BASE ---a
15Ø LI$(1)="1= ADD INFORMATION
16Ø LI$(2)="2= CHANGE INFORMATIO
N
17Ø LI$(3)="3= DELETE INFORMATIO
N
18Ø LI$(4)="4= CHANGE WORKFILE D
RIVE
19Ø LI$(5)="5= RETRIEVE INFORMAT
ION
2ØØ LI$(6)="6= END SESSION
21Ø SL=128:NL=6:AD=Ø:GOSUB 9ØØØ
22Ø ON A GOTO 36Ø,18ØØ,13ØØ,27Ø,
```

```
350,230
230 PRINT @385,STRING$(30,"*");
240 PRINT @417,"SESSION IS OVER
- BYE FOR NOW ";
250 PRINT @449,STRING$(30,"*");
260 FOR I=1 TO 1800:NEXT I:CLS:E
ND
270 CLS0:PRINT "------ DRIVE SEL
ECTION --------d"
280 LI$(1)="1= PUT THE WORKFILE
ON DRIVE 0
290 LI$(2)="2= PUT THE WORKFILE
ON DRIVE 1
300 LI$(3)="3= OK - RETURN TO ME
NU a
310 PRINT @320,"WORKFILE IS ON D
RIVE ";WF$
320 SL=96:NL=3:GOSUB 9000:ON A G
OTO 330,340,140
330 WF$="0":GOTO 310
340 WF$="1":GOTO 310
350 RUN "RETRV
360 CLS0:PRINT "--- ADDING INFO
TO DATABASE ---e"
370 AD=1:LI$(1)="1= ENTER A CHEC
K
380 LI$(2)="2= ENTER A DEPOSIT
390 LI$(3)="3= ENTER A BILL
400 LI$(4)="4= RETURN TO MENU a
410 LI$(5)="5= END THIS SESSION"
:NL=5
420 SL=128:GOSUB 9000:ON A GOTO
500,800,1000,140,230
500 CLS0:PRINT @0,"-----  CHECK
INFORMATION ------b
510 GOSUB 520:GOSUB 540:GOSUB 56
0:GOSUB 580:GOSUB 610:GOTO 630
520 P$="1==ENTER THE MONTH:  1-1
2=======":LV=1:HV=12:SL=64
530 VT$="N":GOSUB 9100:MM$=RIGHT
$("0"+VA$,2):RETURN
540 P$="2==THE DAY: 1-31 =======
========":LV=1:HV=31:SL=128
550 VT$="N":GOSUB 9100:DD$=RIGHT
$("0"+VA$,2):RETURN
560 P$="3==THE CHECK NUMBER: 100
0-9999==":LV=1000:HV=9999
570 SL=192:VT$="N":GOSUB 9100:CN
$=VA$:RETURN
580 P$="4==THE AMOUNT: NNNNNN.NN
 =======":LV=1.00:HV=999999.99
590 VT$ ="D":SL=256:GOSUB 9100
600 AM$=LEFT$(VA$,LEN(VA$)-3)+RI
GHT$(VA$,2):RETURN
610 P$="5==WHO CHECK WAS PAID TO
 =======":SL=320:VT$="A
620 HV=31:GOSUB 9100:CP$=VA$:RET
URN
630 P$="6==WHAT THE CHECK WAS FO
R ======":SL=384:VT$="A
640 HV=58:GOSUB 9100:CF$=VA$
650 GOSUB 9500
660 IF A$ = "Y" GOTO 690
670 A = VAL(A$):IF A > 0 AND A <
7 GOTO 680 ELSE GOTO 650
680 ON A GOSUB 520,540,560,580,6
10,630:GOTO 650
690 CLS0:PRINT "------- ADDING T
HE CHECK -------"
700 PRINT "     P L E A S E    W
 A I T":OK$= MM$+DD$+"C"+CN$
710 WR$ = OK$+"*"+AM$+SS$+CP$+SS
$+CF$
720 GOSUB 9200:GOSUB 9230:CLS0
730 IF GE =1 THEN PRINT "----  C
HECK WAS ADDED    -----dd" ELSE
PRINT "** DUPLICATE CHECK NOT AD
DED **d
740 LI$(1)="1= ADD ANOTHER CHECK
750 LI$(2)="2= ADD OTHER INFORMA
TION
760 LI$(3)="3= RETURN TO MENU a
770 LI$(4)="4= RETRIEVE INFORMAT
ION
780 LI$(5)="5= END THIS SESSION
RIGHT NOW
790 SL=96:NL= 5:GOSUB 9000:ON A
GOTO 500,360,140,350,230
800 CLS0:PRINT "----  DEPOSIT IN
FORMATION  ----e
810 GOSUB 520:GOSUB 540:GOSUB 82
0:GOSUB 580:GOTO 840
820 P$="3==A 4-NUMBER DEPOSIT ID
 =======":VT$="N":SL=192
830 LV=1000:HV=9999:GOSUB 9100:D
C$=VA$:RETURN
840 P$="5==THE SOURCE OF FUNDS =
========":SL=320:HV=64:VT$="A
850 GOSUB 9100:SF$=VA$
860 GOSUB 9510
870 IF A$ = "Y" GOTO 900
880 A = VAL(A$):IF A > 0 AND A <
6 GOTO 890 ELSE GOTO 860
890 IF A=5 GOTO 840 ELSE ON A GO
SUB 520,540,820,580:GOTO 860
900 GOSUB 9200:WR$=MM$+DD$+"D"+D
C$+"*"+AM$+SS$+SF$+SS$
910 OK$ = LEFT$(WR$,9):CLS0:PRIN
T "----  DEPOSIT BEING ADDED ---
---";
920 PRINT @32,"   P L E A S E
  W A I T ":GOSUB 9230
930 CLS0:IF GE=1 THEN PRINT "---
--  DEPOSIT WAS ADDED -----ff" E
LSE PRINT "*** DUPLICATE DEPOSIT
 NOT ADDED
940 LI$(1)="1= ADD MORE DEPOSITS
950 LI$(2)="2= ADD OTHER INFORMA
TION
960 LI$(3)="3= RETURN TO MENU a
970 LI$(4)="4= RETRIEVE INFO FRO
M DATABASE
980 LI$(5)="5= END THIS SESSION
RIGHT NOW
990 NL=4:SL=128:GOSUB 9000:ON A
GOTO 800,360,140,350,230
```

```
1000 CLS0:PRINT "-- BILL TO PAY
INFORMATION --":FR=0
1010 GOSUB 1020:GOSUB 1040:GOSUB
 1060:GOSUB 580:GOSUB 1080:GOTO
1100
1020 P$="1==ENTER THE BILL DUE M
ONTH:1-12":VT$="N
1030 SL=64:LV=1:HV=12:GOSUB 9100
:MM$=RIGHT$("0"+VA$,2):RETURN
1040 P$="2==THE BILL DUE DAY: 1-
31 ======":VT$="N
1050 SL=128:LV=1:HV=31:GOSUB 910
0:DD$=RIGHT$("0"+VA$,2):RETURN
1060 P$="3==A 4-NUMBER ID CODE =
=========":VT$="N
1070 SL=192:LV=1000:HV=9999:GOSU
B 9100:BN$=VA$:RETURN
1080 P$="5==PAY THE BILL TO? ===
=========":VT$="A
1090 SL=320:HV=31:GOSUB 9100:BT$
=VA$:RETURN
1100 P$="6==THE REASON FOR THE B
ILL? ====":VT$="A
1110 SL=384:HV=64:GOSUB 9100:BP$
=VA$
1120 GOSUB 9500
1130 IF A$= "Y" GOTO 1160
1140 A = VAL(A$):IF A > 0 AND A
<7 GOTO 1150 ELSE GOTO 1120
1150 IF A=6 GOTO 1100 ELSE ON A
GOSUB 1020,1040,1060,580,1080:GO
TO 1120
1160 WR$=MM$+DD$+"B"+BN$+"*"+AM$
+SS$+BT$+SS$+BP$
1170 CLS0:PRINT "----- BILL BEIN
G ADDED ---------"
1180 PRINT      "    P L E A S E
    W A I T
1190 GOSUB 9200:OK$ = LEFT$(WR$,
9):GOSUB 9230
1200 CLS0:IF GE=1 THEN PRINT "--
-----  BILL WAS ADDED  ------g"
ELSE PRINT "*** DUPLICATE FOUND
- NOT ADDED ";
1210 LI$(1)="1= ADD MORE BILLS
1220 LI$(2)="2= ADD OTHER INFORM
ATION
1230 LI$(3)="3= RETURN TO MENU a
1240 LI$(4)="4= RETRIEVE INFO FR
OM DATABASE
1250 LI$(5)="5= END THIS SESSION
 RIGHT NOW
1260 SL= 96:NL=5:GOSUB 9000:ON A
 GOTO 1000,360,140,350,230
1300 AD=3:CLS0:PRINT @0,"-----
 WHAT TO DELETE     -----h
1310 LI$(1)="1= DELETE A CHECK
1320 LI$(2)="2= DELETE A DEPOSIT
1330 LI$(3)="3= DELETE A BILL
1340 LI$(4)="4= RETURN TO MENU a
```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```
1350 LI$(5)="5= END THIS SESSION
":NL=5:SL=96:GOSUB 9000
1360 ON A GOTO 1370,1390,1380,14
0,230
1370 OK$ = "C":DV$=" CHECK ":GOT
O 1400
1380 OK$ = "B":DV$=" BILL ":GOTO
 1400
1390 OK$ = "D":DV$=" DEPOSIT
1400 CLS0:PRINT @0,"----  FIND T
HE";DV$;" ----":PRINT @25,"-----
k";
1410 SL=96:P$="1= ENTER"+DV$+"NU
MBER: 1000-9999
1420 VT$="N":LV=1000:HV=9999:GOS
UB 9100:SN$=VA$
1430 SL=160:P$="2= ENTER"+DV$+"M
ONTH: 1-12
1440 VT$="N":LV=1:HV=12:GOSUB 91
00
1450 MM$=RIGHT$("0"+VA$,2)
1460 SL=224:P$="= ENTER"+DV$+"DA
Y: 1-31
1470 VT$="N":LV=1:HV=31:GOSUB 91
00
1480 DD$=RIGHT$("0"+VA$,2):GOSUB
 9200
1490 OK$=MM$+DD$+OK$+SN$:GOSUB 9
230:IF GE=2 GOTO 1620 ELSE CLS0
1500 PRINT @0,"----- THE RECORD
WAS FOUND ----j
1510 LI$(1)="1= DELETE A DIFFERE
NT RECORD
1520 LI$(2)="2= RETURN TO THE FI
RST MENU a
1530 LI$(3)="3= DISPLAY RECORD T
O BE DELETED
1540 LI$(4)="4= ** GO DELETE THE
 RECORD **
1550 LI$(5)="5= END THIS SESSION
1560 SL=96:NL=5:GOSUB 9000
1570 ON A GOTO 1300,140,1680,158
0,230
1580 RA=1:CLS0:PRINT "----- RECO
RD BEING DELETED -----"
1590 PRINT "     P L E A S E
W A I T":GOSUB 9230
1600 CLS0:IF GE=1 THEN PRINT @0,
"+++++ THE RECORD WAS DELETED ++
+++" ELSE GOTO 1620
1610 GOTO 1630
1620 CLS0:PRINT @0,"* RECORD NOT
 FOUND & NOT DELETED
1630 LI$(1)="1= DELETE ANOTHER R
ECORD
1640 LI$(2)="2= RETURN TO MENU a
1650 LI$(3)="3= RETRIEVE FROM TH
E DATABASE
1660 LI$(4)="4= END THIS SESSION
1670 SL=96:NL=4:GOSUB 9000:ON A
GOTO 1300,140,350,230
1680 CLS0:PRINT "- DISPLAY RECOR
D TO BE DELETED -
1690 LI$(1)="1= RETURN TO THE LA
ST MENU
1700 LI$(2)="2= RETURN TO MENU a
1710 LI$(3)="3= ** GO DELETE THE
 RECORD **
1720 SL=96:NL=3:GOSUB 9400:GOSUB
 9000
1730 ON A GOTO 1400,140,1580
1800 AD=2:CLS0:PRINT @0,"------
  WHAT TO CHANGE? ------i";
1810 LI$(1)="1= CHANGE A CHECK
1820 LI$(2)="2= CHANGE A DEPOSIT
1830 LI$(3)="3= CHANGE A BILL
1840 LI$(4)="4= RETURN TO FIRST
MENU a
1850 LI$(5)="5= RETRIEVE INFORMA
TION
1860 LI$(6)="6= END THIS SESSION
"
1870 NL=5:SL=96:GOSUB 9000
1880 CLS0:ON A GOTO 1890,1910,19
00,140,350,230
1890 OK$ = "C":DV$=" CHECK ":GOT
O 1920
1900 OK$ = "B":DV$=" BILL ":GOTO 1920
1910 OK$ = "D":DV$=" DEPOSIT
1920 PRINT @27,"-----";:PRINT @0
,"-- FIND THE";DV$;"TO CHANGE ";
1930 SL=96:P$="1= ENTER THE NUMB
ER: 1000-9999
1940 VT$="N":LV=1000:HV=9999:GOS
UB 9100
1950 SN$=VA$:SL=160:P$="2= ENTER
"+DV$+"MONTH: 1-12
1960 VT$="N":LV=1:HV=12:GOSUB 91
00
1970 MM$=RIGHT$("0"+VA$,2)
1980 SL=224:P$="3= ENTER"+DV$+"D
AY: 1-31
1990 VT$="N":LV=1:HV=31:GOSUB 91
00
2000 DD$=RIGHT$("0"+VA$,2):GOSUB
 9200
2010 OK$=MM$+DD$+OK$+SN$:GOSUB 9
230:IF GE=2 GOTO 2420
2020 CLS0:PRINT @0,"- CHANGE (1-
4) THEN ACT (5-7) -j
2030 LI$(1)="1= CHANGE"+DV$+"AMO
UNT"
2040 LI$(2)="2= CHANGE CLEARED I
NDICATOR
2050 LI$(3)="3= CHANGE"+DV$+"PAI
D TO"
2060 LI$(4)="4= CHANGE CHECK OR
BILL PURPOSE
2070 LI$(5)="5= DISPLAY INFO NOW
 IN RECORD
2080 LI$(6)="6= MAKE NO CHANGES-
START AGAIN
2090 LI$(7)="7= CHANGES COMPLETE
D- MAKE THEM
2100 NL=7:SL=96:GOSUB 9000
2110 ON A GOTO 2130,2190,2240,23
30,2480,2120,2390
2120 CLOSE:GOTO 1800
```

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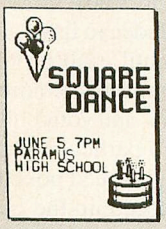
```
2130 PRINT @352,"OLD AMOUNT WAS:
 ";:I=INSTR(11,LI$,SS$)
2140 AM$=MID$(LI$,11,I-11):AM$=L
EFT$(AM$,LEN(AM$)-2)+"."+RIGHT$(
AM$,2)
2150 PRINT USING "$######.##";VA
L(AM$)
2160 P$="ENTER NEW AMOUNT BELOW"
:SL=384:LV=1:HV=999999.99
2170 VT$="D":GOSUB 9100:AM$=LEFT
$(VA$,LEN(VA$)-3)+RIGHT$(VA$,2)
2180 LI$=LEFT$(LI$,10)+AM$+RIGHT
$(LI$,LEN(LI$)-I+1):GOTO 2020
2190 PRINT @352,"CLEARED/PAID WA
S: ";MID$(LI$,10,1);
2200 IF MID$(LI$,10,1)=" " THEN
PRINT " = YES" ELSE PRINT " = NO
"
2210 P$="ENTER ' ' OR '*' BELOW"
:SL=384:VT$="A":HV=1
2220 GOSUB 9100:IF VA$ <> " " AN
D VA$ <> "*" THEN GOTO 2210
2230 MID$(LI$,10,1)=VA$:GOTO 202
0
2240 PRINT @352,"PAID TO WAS: ";
2250 I=INSTR(11,LI$,SS$):J=INSTR
(I+1,LI$,SS$)
2260 IF MID$(LI$,I,1)=CHR$(127)
GOTO 2270 ELSE NEXT I
2270 CP$ = MID$(LI$,I+1,J-I-1)
2280 PRINT CP$:P$="ENTER NEW PAY
 TO BELOW
2290 IF (J-I-1) > 20 THEN SL=416
 ELSE SL=384
2300 VT$="A":HV=31:GOSUB 9100
2310 LI$ = LEFT$(LI$,I)+VA$+RIGH
T$(LI$,LEN(LI$)-J+1)
2320 GOTO 2020
2330 IF LEFT$(DV$,2)=" D" GOTO 2
100 ELSE PRINT @352,"PURPOSE WAS
:";
2340 I= INSTR(11,LI$,SS$):J=INST
R(I+1,LI$,SS$)
2350 CF$ = MID$(LI$,J+1,LEN(LI$)
-J)
2360 PRINT CF$:IF (LEN(LI$)-J) >
 21 THEN SL=416 ELSE SL=384
2370 VT$="A":HV=64:P$="ENTER NEW
 PURPOSE BELOW
2380 GOSUB 9100:LI$=LEFT$(LI$,J)
+VA$:GOTO 2020
2390 RA=1:WRITE #2,LI$
2400 CLS0:PRINT "------ CHANGE B
EING MADE -------"
2410 PRINT "     P L E A S E
 W A I T":GOSUB 9230
2420 CLS0:IF GE =1 THEN PRINT @0
,"--- ";DV$;"WAS CHANGED ----" E
LSE PRINT @0,"*** UNFOUND";DV$;"
NOT CHANGED
2430 LI$(1)="1= CHANGE MORE RECO
RDS
2440 LI$(2)="2= RETURN TO MENU a
2450 LI$(3)="3= RETRIEVE FROM TH
E DATABASE
2460 LI$(4)="4= END THIS SESSION
 NOW
2470 SL= 96:NL=4:GOSUB 9000:ON A
 GOTO 1800,140,350,230
2480 CLS0:PRINT "++ DISPLAY OF C
URRENT VALUES ++m"
2490 LI$(1)="1= RETURN TO THE LA
ST MENU
2500 LI$(2)="2= CHANGE THE RECOR
D AS SHOWN
2510 SL=96:NL=2:GOSUB 9400:GOSUB
 9000:ON A GOTO 2020,2390
9000 FOR I= 1 TO NL:PRINT @SL,LI
$(I)
9007 SL= SL+32:NEXT I
9014 PRINT @32,"*   SELECT FROM
THE FOLLOWING
9021 FOR I = 1 TO 200
9028 A$ = INKEY$:IF A$ <> "" GOT
O 9056 ELSE NEXT I
9035 PRINT @32," ":FOR I = 1 TO
65
9042 A$ = INKEY$:IF A$ <> "" GOT
O 9056 ELSE NEXT I
9049 GOTO 9014
9056 A = VAL(A$):IF A > 0 AND A
< NL+1 THEN RETURN
9063 GOTO 9014
9100 PRINT @SL,P$ :PRINT @SL+32,
" "
9107 PRINT @SL+32,"";
9114 LINE INPUT " >";VA$
9121 LA= LEN(VA$):IF VT$ = "D" G
OTO 9177
9128 IF VT$ = "N" GOTO 9149
9135 IF LA > HV GOTO 9100
9142 RETURN
9149 VV= VAL(VA$):IF VV < LV OR
VV > HV GOTO 9100
9156 IF VT$="D" GOTO 9142
9163 IF RIGHT$(VA$,1)< "0" OR RI
GHT$(VA$,1)> "9" GOTO 9100
9170 IF VV <> INT(VV) GOTO 9100
ELSE GOTO 9142
9177 IF LA > 9 OR LA < 3 GOTO 91
00
9184 IF MID$(VA$,LA-2,1) <> "."
GOTO 9100
9191 GOTO 9149
9200 IF DD$ > "15" THEN DF$ = "1
5" ELSE DF$ = "01
9210 SG$= "M"+ MM$+ "D"+ DF$+ "/
CHK"
9220 CLOSE:OPEN "I",#1,SG$:OPEN
"O",#2,"WORK/CHK:"+WF$:RETURN
9230 IF EOF(1) = -1 GOTO 9270
9240 INPUT #1,LI$:IK$ = LEFT$(LI
$,9)
9250 IF IK$< OK$ THEN WRITE #2,L
I$ ELSE GOTO 9310
9260 GOTO 9230
```

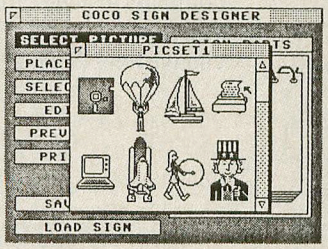
```
9270 ON RA GOTO 9290:ON AD GOTO
9280,9300,9300
9280 WRITE #2,WR$
9290 RA=0:CLOSE:KILL SG$:COPY "W
ORK/CHK:"+WF$ TO SG$:GE=1:RETURN
9300 RA=0:GE=2:CLOSE:RETURN
9310 IF IK$ > OK$ GOTO 9340: 'IN
PUT >=OUTPUT
9320 ON AD GOTO 9300,9330,9330
'INPUT =OUTPT
9330 GE=1:RETURN 'CHANGE
9340 ON AD GOTO 9350,9370,9370:
'INPUT > OUTPUT
9350 ON RA GOTO 9360:WRITE #2,WR
$:WRITE #2,LI$:RA=1:GOTO 9230
9360 WRITE #2,LI$:GOTO 9230
9370 ON RA GOTO 9360:GOTO 9300
9400 PRINT @256,"==== THE CURREN
T RECORD IS =====";
9407 PRINT DV$;"NUMBER:";MID$(LI
$,6,4);
9414 PRINT "  DATE:";LEFT$(LI$,2
);"/";MID$(LI$,3,2)
9421 I=INSTR(11,LI$,SS$):J=INSTR
(I+1,LI$,SS$)
9428 AM$=MID$(LI$,11,I-11):AM$=L
EFT$(AM$,LEN(AM$)-2)+ "." +RIGHT
$(AM$,2)
9435 PRINT @320," AMOUNT:";:PRIN
T USING "$$######.##";VAL(AM$)
9442 PRINT " CLEARED:";MID$(LI$,
10,1)
9449 PRINT " TO/FROM:";MID$(LI$,
I+1,J-I-1)
9456 IF LEFT$(DV$,2)=" D" THEN R
ETURN
9463 PRINT " PURPOSE:";RIGHT$(LI
$,LEN(LI$)-J):RETURN
9500 JF=384:JB=1:GOTO 9520
9510 JF=320:JB=2
9520 PRINT @0,"---  FINAL O.K.
OR CHANGE ----c
9530 PRINT @32," TYPE 'Y' IF ALL
 ITEMS ARE O.K.
9540 FOR J=64 TO JF STEP 64:PRIN
T @J,"=";
9550 PRINT @J+32," ";:NEXT J
9560 FOR I = 1 TO 350
9570 A$=INKEY$:IF A$ <> "" GOTO
9640 ELSE NEXT I
9580 PRINT @32,PM$;:PRINT @96,"1
";:PRINT @160,"2";
9590 PRINT @224,"3";:PRINT @288,
"4";:PRINT @352,"5";
9600 ON JB GOTO 9610,9620
9610 PRINT @416,"6";
9620 FOR I=1 TO 450
9630 A$=INKEY$:IF A$ <> "" GOTO
9640 ELSE NEXT I:GOTO 9530
9640 RETURN
```


Make Signs, Banners, and Greeting Cards!



The Coco Graphics Designer Plus $29.95

Super easy-to-use point and click graphical interface, features windows, scroll bars, radio buttons, and joystick or mouse control.



The CoCo Graphics Designer Plus (CGDP) is CoCo 2 and 3 Compatible. It allows pictures, and text in up to 4 sizes and 16 fonts, per page or banner. The cards & signs feature hi-resolution borders and complete on-screen previews. The CGDP comes with 16 borders, 5 fonts, and 32 pictures. It's 100% machine language for fast execution.

Printer Support Radio Shack DMP105, 106, 110,120, 130, 132, 200, 400, 420, 430, 440, 500, Epson FX/RX/LX/EX/LQ, Gemini 10X, Star SG10, NX10, NX1000, Panasonic KXP1080, 1090, 1091, 1092, Prowriter, C. Itoh 8510 & more.. Call for complete list.

Requirements: 64K CoCo II or III, disk drive with RSDOS, mouse or joystick.

Max Compatible
Zebra's Picture disks 2, 3, and 4 include a simple format conversion utility making them easy to use with Colorware's MAX-10, CoCo MAX II and III.

In addition to the font, border, and picture collections that come with the CoCo Graphics Designer Plus, the following optional disks are available for $14.95 each.

Border Disk #1 Contains 176 High resolution borders, great variety from simple to ornate.
Font Disk A 10 Fonts: Western, Stencil, Banner, Shadow, Variety, Type, Stripes, Digital, Bold3, Object
Font Disk B 10 Fonts: Arcade, Circle, Alien, Cube, Baroque, Deco, Block, Gray, Computer, Script
Picture Disk #2 4 sets of 30 pictures each: Sports, America, Party, Office, Total 120 pictures.
Picture Disk #3 4 sets of 30 pictures each: Animals, Nature, Religion, Travel, Total 120 pictures.
Picture Disk #4 120 holiday pictures: Christmas, Thanksgiving, New Year's, Easter, Halloween, etc.

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD add $3.00. VISA/MC Accepted. NY residents add sales tax.

Zebra Systems, Inc., 78-06 Jamaica Ave., Woodhaven, NY 11421 (718) 296-2385

Smiling faces reward your child's efforts in math

BOOKWORM

By John Collicott

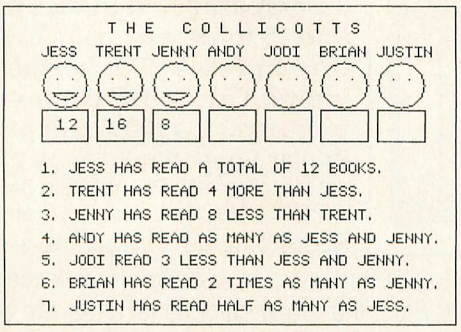
The program *Bookworm* was written as a result of a math worksheet my first-grade daughter, Jenny, brought home. We originally bought our Color Computer for educational purposes and are always on the lookout for something the kids can use to develop their skills.

The objective of the program is to help develop problem-solving skills in math. The program level is for first- to second-graders. However, you can adjust the value of V in Line 60 to raise the grade level.

A note of caution: The value of V in Line 60 should always be an even value because division is used in problem solving. An uneven number produces a decimal you probably do not want. I recommend the value never be less than 20 because too low a value produces negative numbers. The title screen is displayed while the back screen is being drawn so there is a pause until the back page is scrolled onto the front page.

John Collicott is an officer in two computer clubs. He writes programs for the Color Computer and the IBM PC and has published several articles. He is a former Radio Shack employee.

Because the program is in PMODE 4 graphics, the kids have a little more incentive to learn. Graphics always make our kids more eager to play. The concept of books is related to the excellent Book-It and RIF (Reading Is Fundamental) programs in the public school systems. My kids love to read and have racked up large totals. If your kids are also involved in these programs, relate the concept to them to make it more interesting.


THE COLLICOTTS
JESS TRENT JENNY ANDY JODI BRIAN JUSTIN
12 16 8
1. JESS HAS READ A TOTAL OF 12 BOOKS.
2. TRENT HAS READ 4 MORE THAN JESS.
3. JENNY HAS READ 8 LESS THAN TRENT.
4. ANDY HAS READ AS MANY AS JESS AND JENNY.
5. JODI READ 3 LESS THAN JESS AND JENNY.
6. BRIAN HAS READ 2 TIMES AS MANY AS JENNY.
7. JUSTIN HAS READ HALF AS MANY AS JESS.

As your child plays and tries to solve the problem, there is a computer-drawn child's face with an expression on it. When the computer receives the correct answer, the face smiles and proceeds to the next computer-drawn face. When the answer is wrong, the face frowns and the user remains positioned on that face. The correct total is displayed in each child's box.

It might be a good idea to have an adult stay with the child until each problem is solved. Some of the problems require reference to previous values and your child may need assistance with a particular problem.

I have used the high-speed poke for the CoCo 2 in order to speed up the graphics display process and to guarantee that the computer catches the keyboard input. If you have a CoCo 3, you may want to change lines 20 and 910 to read as follows:

```
20 POKE 64597,0
910 IF Q$="N" OR Q$="n" THEN POKE
65494,0:END
```

There are problems involved with the high-speed poke that relate to a SAVE or READ from the disk or cassette. Because it throws things out of whack, you may want to leave it out entirely or add Line 20 only after you know the program works and is saved in its working condition.

(Questions or comments concerning this article may be addressed to the author at 201 E. Morgan, Inman, KS 67546. Please include an SASE if requesting a reply.) ❑

24Ø	33	122Ø	184
5ØØ	1Ø	143Ø	187
68Ø	76	END	86
95Ø	89		

The listing: BOOKWORM

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
10 '/* BOOKWORMS WRITTEN BY JOHN
 COLLICOTT
20 POKE 65495,Ø:' SPEED UP POKE
30 CLEAR
40 CLS
50 PCLEAR 8
60 V = 20:'RANDOM SEED VALUE
70 DIM A$(50), K(7), P(50)
80 GOSUB 1190
90 PMODE 4, 1: PCLS: SCREEN 1, 1
100 W$ = "THE BOOKWORMS"
110 X = 24: XX = 50: XY = 16: DR
AW "S8": GOSUB 1120
120 X = 25: GOSUB 1120
130 W$ = "WRITTEN BY JOHN COLLIC
OTT"
140 DRAW "S4"
150 X = 24: XX = 180: XY = 8: GO
SUB 1120
160 X = 25: GOSUB 1120
170 ' /* DRAW SCREEN */
180 PMODE 4, 5: PCLS (1)
190 COLOR Ø
200 W$ = "THE COLLICOTTS"
210 X = 44: XX = 10: XY = 12
220 DRAW "BM50,60;S4": GOSUB 112
Ø
230 W$ = "JESS  TRENT JENNY ANDY
  JODI  BRIAN JUSTIN"
240 X = Ø: XX = 25: XY = 6: GOSU
B 1120
250 ' /* DRAW KIDS */
260 FOR X = Ø TO 230 STEP 36
270 CIRCLE (X + 15, 44), 15
280 PSET (X + 10, 40)
290 PSET (X + 20, 40)
300 LINE(X,60)-(X+30,80),PSET,B
310 NEXT X
320 GOSUB 1010
330 W$ = "1. JESS HAS READ A TOT
AL OF" + STR$(JS) + " BOOKS."
340 X = Ø: XX = 100: GOSUB 1120
350 W$ = "2. TRENT HAS READ 4 MO
RE THAN JESS."
360 X = Ø: XX = XX + 15: GOSUB 1
120
370 W$ = "3. JENNY HAS READ 8 LE
SS THAN TRENT."
380 X = Ø: XX = XX + 15: GOSUB 1
120
```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```
390 W$ = "4. ANDY HAS READ AS MA
NY AS JESS AND JENNY."
400 X = 0: XX = XX + 15: GOSUB 1
120
410 W$ = "5. JODI READ 3 LESS TH
AN JESS AND JENNY."
420 X = 0: XX = XX + 15: GOSUB 1
120
430 W$ = "6. BRIAN HAS READ 2 TI
MES AS MANY AS JENNY."
440 X = 0: XX = XX + 15: GOSUB 1
120
450 W$ = "7. JUSTIN HAS READ HAL
F AS MANY AS JESS."
460 X = 0: XX = XX + 15: GOSUB 1
120
470 '/* COPY LAST PAGE TO FRONT
480 FOR SC = 0 TO 192
490 PMODE 4, 5
500 GET(0,SC)-(255,SC),P,G
510 PMODE 4, 1
520 PUT(0,SC)-(255,SC),P,PSET
530 NEXT SC
540 COLOR 1: PMODE 4, 5
550 LINE(0,100)-(255,90),PSET,BF
560 COLOR 0: PMODE 4, 1
570 '/* PLAY THE GAME
580 W$ = STR$(JS)
590 COLOR 0
600 X = 2: XX = 72: XY = 8: GOSU
B 1120
610 K = 1
620 CIRCLE (15, 44), 10, 0, 1, .
1, .4
630 LINE(7,49)-(21,49),PSET
640 FOR G = 36 TO 230 STEP 36
650 Q$ = "": GS$ = "": X = G + 6
660 Q$ = INKEY$
670 COLOR 1
680 LINE(G,60)-(G+30,80),PSET,B
690 COLOR 2
700 LINE(G,60)-(G+30,80),PSET,B
710 IF Q$ = "" THEN 660
720 IF Q$ = CHR$(13) THEN 770
730 IF Q$ = CHR$(8) THEN GOTO 16
60
740 GS$ = GS$ + Q$
750 W$ = Q$: XX = 72: GOSUB 1120
760 GOTO 660
770 IF VAL(GS$) = K(K) THEN 780
ELSE 830
780 CIRCLE (G + 15, 44), 10, 0,
1, .1, .4
790 LINE(G+7,49)-(G+21,49),PSET
800 K = K + 1
810 NEXT G
820 GOTO 860
830 LINE(G+7,49)-(G+21,49),PSET
840 COLOR 1:LINE(G,60)-(G+30,80)
,PSET,BF:COLOR 2
```


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Real BASIC for OS9! ***R.S.B. V1.3 $39.95***

Burke & Burke's R.S.B. software gives you a complete, OS9-compatible version of Disk Extended Color BASIC. We've added new software for OS9-style graphics, sound, printer, and disk I/O. The BASIC you know and love is now running under Level 2 OS9 windows!

R.S.B. loads and saves files using OS9's file format, so we've also included utilities to transfer BASIC programs and data files betwen OS9 and BASIC disks. Of course, you can't use R.S.B. to run machine language programs, and some BASIC commands work slightly differently under R.S.B.

Requires CoCo 3, 256K RAM, floppy controller with either Tandy Disk BASIC or DISTO CoCo 3 CDOS, and Level 2 OS9.

CoCo-XT Hard Disk Interfaces

NO HALT • 1 or 2 hard drives • 30% faster than SASI • Uses PC-type hard disk drives & controllers • 5 Meg to 120 Meg per drive • Does not use interrupts • Multi-PAK recommended • Includes EZGen boot file editor for easy installation • CoCo XT-RTC includes real-time clock

CoCo XT $69.95 *CoCo XT-RTC* $99.95

XT-ROM AUTO-BOOT ROM . . . Automatically boots OS9 from your Burke & Burke hard disk at power-up. Use XT-ROM as a convenience, or for fail-safe CoCo operation in unattended BBS, home security systems, etc.

XT-ROM $19.95 *4' hard disk cable set $17.50*

HYPER-I/O $29.95
Modifies Disk BASIC to use hard disks (CoCo XT, DISTO, LR), RAM disks, & any mix of 35-160 track floppy drives. Fully reset protected, 16K EPROM-able.

HYPER-III $12.95
RAM disk and printer spooler add-on for HYPER-I/O. Requires 512K CoCo 3 and HYPER-I/O.

HYPER-I/O Utilities $21.95
Kevin Berner's wildcard copy, delete, and file search utilities for HYPER-I/O

HYPER-I/O Disk Doctor $17.95
Kevin's second utility package. Find bad disk sectors, edit GAT/FAT, etc.

Both utility packages for $37.95

EZGen Version 1.06 $19.95
Powerful OS9 bootfile editor. Change module names, add or delete modules, patch bytes, or rearrange modules. Works on other files, too.

PERTASCII $19.95
Level 2 OS9 scrambled-letter word game for 1-16 players. Play against the computer's 15,000 word dictionary or friends. 256K.

```
850 GOTO 650
860 ' /* REPEAT GAME
870 COLOR 1:LINE(0,0)-(255,15),P
SET,BF:COLOR 2
880 W$ = "WOULD YOU LIKE TO PLAY
 AGAIN Y OR N"
890 X = 20: XX = 10: XY = 6: GOS
UB 1120
900 Q$ = INKEY$: IF Q$ = "" THEN
 900
910 IF Q$ = "N" OR Q$ = "n" THEN
 POKE 65494,0:END
920 COLOR 0
930 FOR C=1 TO 4:PCOPY C+4 TO C:
NEXT C
940 GOSUB 1010
950 W$ = "1. JESS HAS READ A TOT
AL OF" + STR$(JS) + " BOOKS."
960 X = 0: XX = 100: XY = 6: GOS
UB 1120
970 XY = 8
980 GOTO 580
990 GOTO 990
1000 '/* RANDOM GENERATOR
1010 BB = RND(-TIMER)
1020 JS = INT(RND(V))
1030 IF JS < 12 GOTO 1020
1040 IF JS / 2 = INT(JS / 2) THE
N 1050 ELSE 1020
1050 K(1) = JS + 4
1060 K(2) = K(1) - 8
1070 K(3) = JS + K(2)
1080 K(4) = (JS + K(2)) - 3
1090 K(5) = K(2) * 2
1100 K(6) = JS / 2
1110 RETURN
1120 ' DRAWING ROUTINE
1130 FOR Y = 1 TO LEN(W$)
1140 L$ = MID$(W$, Y, 1)
1150 A = INSTR("0123456789 ABCDE
FGHIJKLMNOPQRSTUVWXYZ.,?+-*:", L
$)
1160 DRAW "BM" + STR$(X) + "," +
 STR$(XX) + ";" + A$(A)
1170 X = X + XY: NEXT Y
1180 RETURN
1190 ' ************************
1200 ' CODES FOR LETTERS
1210 A$(1) = ";BU1F1R2E1U4H1L2G1
D4E4": ' 0
1220 A$(2) = ";R4L2U6G1": ' 1
1230 A$(3) = ";R4L4E4U1H1L2G1":
' 2
1240 A$(4) = ";BU1F1R2E1U1H1E1U1
H1L2G1": ' 3
1250 A$(5) = ";BR3U6G3R4": ' 4
1260 A$(6) = ";BU1F1R2E1U2H1L3U2
R4": ' 5
1270 A$(7) = ";BU1F1R2E1U1H1L2G1
D1U4E1R2F1": ' 6
1280 A$(8) = ";BR4U6L4": ' 7
1290 A$(9) = ";BU1F1R2E1U1H1L2R2
E1U1H1L2G1D1F1G1D1": ' 8
1300 A$(10) = ";BU1F1R2E1U4H1L2G
1D1F1R2E1": ' 9
1310 A$(11) = "BR4"' BLANK
1320 A$(12) = "U4E2F2D1L4R4D3":
' A
1330 A$(13) = "U6R3F1D1G1L3R3F1D
1G1L3": ' B
1340 A$(14) = "BU1BR4G1L2H1U4E1R
2F1": ' C
1350 A$(15) = "U6R3F1D4G1L3": '
D
1360 A$(16) = "U6R4L4D3R3L3D3R4"
: 'E
1370 A$(17) = "U6R4L4D3R3": 'F
1380 A$(18) = "BU3BR2R2D2G1L2H1U
4E1R2F1": 'G
1390 A$(19) = "U6D3R4U3D6": ' H
1400 A$(20) = "R4L2U6L2R4": ' I
1410 A$(21) = "BU1F1R2E1U5": ' J
1420 A$(22) = "U6D4E4G3F3": ' K
1430 A$(23) = "U6D6R4": ' L
1440 A$(24) = "U6F2E2D6": ' M
1450 A$(25) = "U6D1F4D1U6": ' N
1460 A$(26) = "BU1F1R2E1U4H1L2G1
D4": ' O
1470 A$(27) = "U6R3F1D1G1L3": '
P
1480 A$(28) = "BU1F1R2H1F2H1E1U4
H1L2G1D4": ' Q
1490 A$(29) = "U6R3F1D1G1L3R1F3"
: ' R
1500 A$(30) = "BU1F1R2E1U1H1L2H1
U1E1R2F1": ' S
1510 A$(31) = "BR2U6L2R4": ' T
1520 A$(32) = "BU1U5D5F1R2E1U5":
 ' U
1530 A$(33) = "BU2U4D4F2E2U4": '
 V
1540 A$(34) = "U6D6E2F2U6": ' W
1550 A$(35) = "U1E4U1D1G2H2U1D1F
4D1": ' X
1560 A$(36) = "BR2U4H2F2E2": ' Y
1570 A$(37) = "R4L4U1E4U1L4": '
Z
1580 A$(38) = "BR1U1": ' .
1590 A$(39) = "BR1U1D1G1": ' ,
1600 A$(40) = "BR2U1BU1U1R1E1U1H
1L2G1": ' ?
1610 A$(41) = "BU3R4L2U2D4": '+
1620 A$(42) = "BU3R4": '-
1630 A$(43) = "BR2BU1U4D2R2L4R2E
1G2E1H1F2": '*
1640 A$(44) = "BR2BU2U1BU1U1": '
 :
1650 RETURN
1660 IF LEN(GS$) < 1 THEN 660
1670 X = X - XY
1680 COLOR 1
1690 LINE(X,72)-(X+6,65),PSET,BF
1700 COLOR 2
1710 GS$ = LEFT$(GS$, LEN(GS$) -
 1)
1720 GOTO 660
```

RASCAN

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A new extension to a familiar language

Introducing BASIC+

By Geoff Friesen

The Color Computer 3 contains a powerful but limited BASIC interpreter. Variable names are still restricted to two characters of significance and no structured looping mechanism exists (besides FOR/NEXT). You can smash the piggy bank and purchase OS-9 as well as C or Pascal09 (BASIC09 comes with OS-9 Level II), but you need to learn OS-9 before the language of your choice can be used to develop programs. It's not that I'm against OS-9, but I believe BASIC can be made more powerful — that's why I'm introducing *BASIC+*.

BASIC+ is an extension of BASIC — new commands have been created to enhance what already exists. These commands are summarized in Table 1 along with their token codes.

REPEAT and UNTIL form the backbone of structured loops. Such loops can eliminate the excessive use of GOTOs, which often lead to unmanageable code. Basically you *repeat* zero or more statements *until* an expression becomes *true*. REPEAT loops, like FOR loops, can be nested but do not jump into or out of either loop via a GOTO. If an UNTIL is encountered without a matching REPEAT, a UR (Until without Repeat) Error occurs and ERNO (at RUNTIME) contains 40.

Command	Token
REPEAT	249
UNTIL	250
BEEP	21
OLD	22
WAIT	253
SWAP	254

Table 1: *BASIC+* Command Summary

The SWAP command causes the values of two variables to be exchanged. Both variables must be of the same type (string or numeric); otherwise a TM Error occurs. SWAP is useful in sorting programs.

The OLD command allows you to recover a program accidentally erased by the NEW command. The program is recovered as long as you do not create any variables, enter one or more program lines, or make any Syntax errors.

WAIT is used to insert a pause in your program. Press any key to continue. BEEP is a leftover and is essentially the same as SOUND 180,6.

Listing 1 contains a BASIC program that creates *BASIC+* when run. Two items in this listing are worth mentioning: First, Line 135 contains a poke that corrects a flaw in the interpreter. This flaw pertains to the octal numbering system. The octal system allows only digits 0 through 7, but 8 is permitted by the interpreter. The poke gets rid of the 8. Second is the prompt change from OK to Ready. If you prefer OK, omit lines 650 and 655 when entering this program.

Listing 2 illustrates *BASIC+* commands. The program in this listing accomplishes a simple bubble sort. Every *BASIC+* command except OLD is shown.

BASIC+ should be active before running a program written with its commands. Such programs, when listed, may cause the computer to hang. If this happens, press the Reset button on the back of the computer. Note that you will have to reload *BASIC+* whenever you press Reset.

BASIC+ can be used in either cassette or disk environments, but a disk environment is more fun. It works only on a Color Computer 3, but in the future this may change. I plan to add new functions and am working on an ambitious project to create a facility to let variable names have more than two characters of significance. All commands except BEEP (as well as their current token values), are preserved.

So there you have it. BASIC is just beginning to grow. Keep reading THE RAINBOW for further developments.

(Questions or comments concerning this article may addressed to the author at General Delivery, Dauphin, MB, Canada R7N 2T3. Please include an SASE when requesting a reply.) ❑

Geoff Friesen, a software engineer who holds a Bachelor of Science degree in computer science and mathematics, has authored several computer articles.

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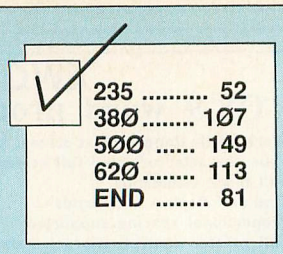


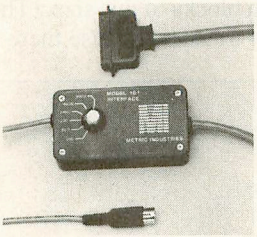
Listing 1: BASIC+

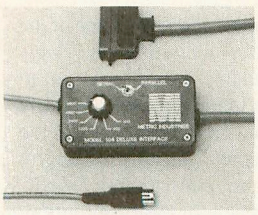
```
0 ' COPYRIGHT 1989  FALSOFT,INC
100 '**********************
105 '*** BASIC+  VER 1 ***
110 '***  COCO3  ONLY  ***
115 '**********************
120 '
125 'FIX OCTAL ROUTINE BUG
130 '
135 POKE &H8803,&H24
140 '
145 'RESERVE MEMORY
150 '
155 CLEAR 200,&H7DFF
160 '
165 'INSTALL NEW COMMAND CODE
170 '
175 FOR I=&H7E00 TO &H7ECA
180 READ B$
185 POKE I,VAL("&H"+B$)
190 NEXT I
195 '
200 'REPEAT-UNTIL
205 '
210 DATA 26,10,C6,03,BD,AC,33,DE
215 DATA A6,9E,68,86,CE,34,52,7E
220 DATA AD,9E,39,BD,B1,41,9D,A5
225 DATA 26,F8,96,4F,26,1F,86,FF
230 DATA 97,3B,BD,AB,F9,1F,14,81
235 DATA 4E,27,05,C6,50,7E,AC,46
240 DATA AE,61,EE,63,9F,68,DF,A6
245 DATA 10,AE,65,6E,A4,86,FF,97
250 DATA 3B,BD,AB,F9,1F,14,81,4E
255 DATA 27,02,20,DF,35,52,39
260 '
265 'BEEP
270 '
275 DATA 26,14,C6,B4,D7,8C,0F,8D
280 DATA C6,18,D7,8E,BD,A9,56,8E
285 DATA 4E,20,30,1F,26,FC,39
290 '
295 'OLD
300 '
305 DATA 26,FD,9E,19,33,04,A6,C0
310 DATA 26,FC,EF,84,CC,FF,FF,BD
315 DATA AD,01,30,02,32,62,10,8E
320 DATA AC,73,34,20,7E,AD,1F
325 '
330 'WAIT
335 '
340 DATA 26,03,7E,AD,FB,39
345 '
350 'SWAP
355 '
360 DATA BD,B3,57,D6,06,F7,7F,0D
365 DATA BF,7F,0F,BD,B2,6D,BD,B3
370 DATA 57,D6,06,F1,7F,0D,27,05
375 DATA C6,18,7E,AC,46,BF,7F,11
380 DATA BE,7F,0F,10,BE,7F,11,EC
385 DATA 81,EE,A1,ED,3E,EF,1E,EC
390 DATA 81,EE,A1,ED,3E,EF,1E,A6
395 DATA 84,E6,A4,A7,A4,E7,84,39
400 '
405 'INSTALL COMMAND ADDRESSES
410 '
415 FOR I=&H7ECB TO &H7F04
420 READ B$
425 POKE I,VAL("&H"+B$)
430 NEXT I
435 '
440 DATA F6,36,E5,F0,E6,88,E5,45
445 DATA E6,CF,E6,F4,EB,F5,EA,49
450 DATA E8,82,ED,E5,ED,ED,ED,58
455 DATA EF,3F,E3,D4,E3,E6,F8,D2
460 DATA F9,25,E7,61,E7,65,F3,9D
465 DATA E6,76,E6,74,F9,B9,7E,00
470 DATA 7E,13,7E,4F,7E,66,7E,85
475 DATA 7E,8B
480 '
485 'INSTALL ASCII TABLE
490 '
495 FOR I=&HE236 TO &HE24F
500 READ B$
505 POKE I,VAL("&H"+B$)
510 NEXT I
515 '
520 DATA 52,45,50,45,41,D4
525 DATA 55,4E,54,49,CC
530 DATA 42,45,45,D0
535 DATA 4F,4C,C4
540 DATA 57,41,49,D4
545 DATA 53,57,41,D0
550 '
555 'MODIFY BASIC VECTORS
560 '
565 POKE &HE162,&H1D
570 POKE &HE1A1,&H7E
575 POKE &HE1A2,&HCB
580 POKE &HE197,&HFE
585 '
590 'INSTALL NEW PROMPT MSG
595 '
600 POKE &H7F05,13
605 FOR I=&H7F06 TO &H7F0A
610 READ B$: POKE I,ASC(B$)
615 NEXT I
620 DATA R,E,A,D,Y
625 POKE &H7F0B,13
630 POKE &H7F0C,0
635 '
640 'INSTALL PROMPT VECTOR
645 '
650 POKE &HAC77,&H7F
655 POKE &HAC78,&H05
660 '
```

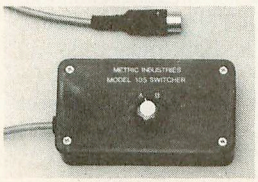
```
665 'INSTALL ERROR MODIFICATION
670 '
675 FOR I=&H7F13 TO &H7F25
680 READ B$
685 POKE I,VAL("&H"+B$)
690 NEXT I
695 '
700 DATA C1,50,26,0C,BD,B9,5C,BD
705 DATA B9,AF,8E,7F,FE,7E,E4,96
710 DATA 7E,AC,49
715 '
720 POKE &H7FFE,ASC("U")
725 POKE &H7FFF,ASC("R")
730 '
735 POKE &HE4B1,&H7F
740 POKE &HE4B2,&H13
745 '
750 'ENTER BASIC+
755 '
760 WIDTH 40
765 PRINT "BASIC+  VER 1"
770 PRINT: NEW
```

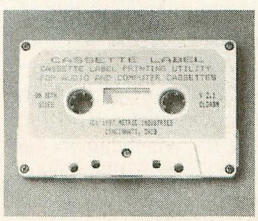
Listing 2: BSORT

```
0 ' COPYRIGHT 1989  FALSOFT,INC
100 REM ******************
110 REM *** BUBBLE SORT ***
120 REM ******************
130 REM
140 CLEAR 1000
150 N=10: DIM A$(N): CLS
160 PRINT "*** SORT DEMO ***"
170 PRINT
180 PRINT "ENTER DATA": PRINT
190 FOR I=1 TO N
200 INPUT A$(I)
210 NEXT I
220 PRINT
230 PRINT "PRESS ANY KEY TO SORT
"
240 WAIT
250 CLS: PRINT "SORTING..."
260 P=1: REPEAT
270 I=1: REPEAT
280 IF A$(I)>A$(I+1) THEN SWAP A
$(I),A$(I+1)
290 I=I+1
300 UNTIL I>N-P: P=P+1: UNTIL P>
N-1
310 BEEP: PRINT "SORTING ENDED"
320 PRINT "PRESS ANY KEY"
330 WAIT: CLS
340 FOR I=1 TO N
350 PRINT A$(I)
360 NEXT
370 END
```







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Classified ads, regional services, etc.

New Horizons

By Don Hutchison
Rainbow Contributing Editor

The CoCo and OS-9 SIGs now have an area for classified ads, where users can buy and sell items without the bother of leaving Forum messages. Here are the rules regarding the classified ads:

- Ads must be from individuals only. No business ads are permitted.
- Ads must be for hardware items only. Ads for software are not permitted.
- The ads must be for CoCos and related products.
- The usual guidelines regarding taste and courtesy must be observed. All ads are reviewed before being made available to the public.

Once an ad is posted, it remains visible for 60 days or until the item sells, whichever comes first. Users are asked to notify a member of the SIG staff when a sale occurs so the ad can be removed. This also saves the user from continuing Delphi Mail concerning the item.

To get to the classified section, just type CLASS at the CoCo SIG or OS9 prompt.

Presently, classified ads can be placed into any of three groups: "For Sale," "Items Wanted" and "CoCo User Groups." Other categories may be added if there is sufficient interest.

There is also a Search feature for locating items quickly. The SEARCH command scans across all available categories in search of the user's chosen keyword, so it's a good idea to provide as many keywords as possible when you post your ad.

The classified section is designed to be easy to use. As with most sections on Delphi, simply striking the ENTER key provides the user with the most common, logical response. For example, to read the first article in a section, simply press ENTER. You can keep pressing ENTER to read the articles in order until you have read them all. You can type NO at any "More?" prompt within an article to stop reading and move on to the next article. Other commands available include:

- SCAN — Lets you list the table of contents for this news category. Optionally includes an article number such as SCAN 50 to begin listing the contents from Item 50. SCAN, without an item number, lists the next 20 items. To continue from there, enter either SCAN, MORE or just press ENTER at the next prompt.
- READ — Lets you read one or more articles. Enter the article number(s) or ranges separated by commas as part of the command READ 2,5-7. If you want the text in the articles to be displayed continuously, without stopping when your screen is full, use the NONSTOP command: READ 1-5 NONSTOP. If you do not supply an article number, the next article is displayed. Note: You don't need to type the word READ. You may enter the article numbers alone to read the articles you want.
- NEXT — Lets you read the story immediately following the one most recently read. (Pressing the ENTER key on a new line does the same thing.)
- BACK — Lets you read the story immediately preceding the one most recently read.
- EXIT — Lets you leave the category. (CTRL-Z works, too.)

Ymodem Downloads

Several users have asked about the block counts Delphi displays just prior to a Ymodem download. The confusion arose because the block counts don't appear to be correct and users think they are being sent extra data blocks simply because they are using Ymodem protocol. Not so!

The normal block size for Ymodem transfers is 1024 bytes, although the Ymodem protocol also allows for 128-byte blocks. Delphi will send data blocks to you in the larger size if there is enough data left in the file to form blocks of this size. (This results in a faster transfer because there is

Don Hutchison is an electrical engineer and lives in Atlanta, Georgia. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

Database Report

By Gregory A. Law
CoCo SIG Database Manager

OS-9 Sig

In the General Information section **Mitch Thompson** (MADWAND) gave us a humorous parody of the *Star Wars* movies using technical and programming jargon from various mainframes.

In the Applications section **Robert Thomas** (BOBTHOMAS) brought us a nice game of *Sokoban* that plays just like the ROM Pak version, except it also loads and saves the game in progress. **Paul Quinn** (PQUIN) uploaded a program that simulates selective evolution, displaying a representation of the bottom of a primordial pool with white bugs and green bacterial food. **Tim Koonce** (TIMKOONCE) gave us a driver program for the Imagewise video digitizer written by Jim Omura.

In the Utilities section **John Beveridge** (JOHNTORONTO) uploaded a disk zapper for OS-9 Level II. **Pete Lyall** (OS9UGVP) provided us with an excellent shareware hard-disk back up and restore program, including full documentation and tutorials. Tim Koonce gave us a public domain clone of the OS-9 dump utility, including *Assembly Source*, a printer utility that allows you to change various printer features, a fairly complete command-line interface to the windowing commands, and a program to reboot the system and return to Disk BASIC without having to reach for the Reset button. **Brian Wright** (POLTERGEIST) uploaded OS-9 versions of the UNIX unencode and decode utilities.

In the Patches section **Mike Sweet** (DODGECOLT) gave us two MODPATCH files that alter *GrfDrv* to display up to 25 lines of text and 200 lines of graphics.

In the Telecom section **Newton White** (PERFUMER) uploaded version 2.0.7 of *OSTerm* written by Vaughn Cato with support for Ymodem batch file transfers. **Tom Wyrick** (WYRICK) submitted a BBS file lister for use with *RiBBS*, which allows the users to enter comments, vote on their favorites, and edit, delete and add entries. **Jason Lambert** (BOODOOZER) gave us a

less "handshaking" than with Xmodem.) However, near the end of the file there may not be enough data remaining to form a 1024-byte block, so Delphi will use a 128-byte block size to reduce the total number of bytes sent.

For example, if you use Ymodem to download a file that is 1250 bytes in length, you'll be sent one 1024-byte block and two 128-byte blocks, making a total of 1280 bytes transferred to your computer. If Delphi sent only 1024-byte blocks to you, you would receive 2048 total bytes of which 798 would be "extra." The superfluous characters would be "pad" characters, usually $1A bytes. By sending you the shorter 128-byte blocks, Delphi transfers only 30 bytes more than the file actually contains.

This method is in conformance with the established standard for Ymodem. Users may become confused thinking that it is a fault with Delphi, because all systems don't handle the last block per the Ymodem specifications. Some BBSs send only 1024-byte blocks (a practice sometimes called "1K Xmodem") and call their transfers Ymodem. Delphi implements true Ymodem, which uses two different block sizes, depending upon the amount of data that must be transferred. By doing so, Delphi conforms to the standard set by the designers of the Ymodem protocol.

This also means that the Ymodem protocol can remain somewhat compatible with the Xmodem standard. For example, if a user starts an Xmodem download on Delphi and accidentally starts his terminal program doing a Ymodem transfer, he will still be able to complete the download successfully.

Delphi/KC

Delphi has implemented regional services recently. Delphi/Boston and Delphi/Kansas City are the first two such areas devoted to the special interests of regional groups of users. Of the two, Delphi/KC features a CoCo users' group online.

Delphi/Kansas City started serving the greater Kansas City area in October of 1988. It was started by a young entrepreneur named John Phelan, along with a group of investors. The idea was to offer limited access to Delphi's services at a flat monthly rate, using digital private lines rather than the networks like Telenet or Tymnet. The monthly rate includes unlimited 24-hour access to Delphi's AP news wire, business and market watch, Grolier's Encyclopedia, Terra Nova and several online games such as *Flipit*, *Scramble* and the *TQ Trivia Tournament*. Delphi/KC features its own CoCo SIG called the Kansas City Color Computer Club SIG. The Kansas City club has about 80 dues-paying members, 22 of them active Delphi members. One of the purposes of the KC CoCo SIG is to offer services of interest to CoCo users in the midwest. It is not simply a carbon copy of the national CoCo SIG — both SIGs are entirely separate areas with their own independent forums and databases.

Greg Wathen is the SysOp and has patterned the SIG much like the national CoCo and OS-9 SIGs, except on a smaller scale. Greg was a Delphi member for several years and has owned a CoCo for quite a while longer.

Greg invites everyone to stop by the Kansas City CoCo SIG on Delphi/KC. Just type `DELPHI/REGIONAL` at the main menu on Delphi.

Rainbow Services

Have you tried the RAINBOW Services area of the SIG yet? Just enter `RAINBOW` at the CoCo SIG or OS9 prompts to get to them. Here are some of the services available:

- Make RAINBOW Address Changes
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- Send Letters to RAINBOW's Editors
- Submit Letters to Marty Goodman and Doctor ASCII
- Order RAINBOWfest Tickets
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replacement, *TSMon*, that detects the baud rate of the caller and then runs a user-specified program.

In the Graphics and Music section **Mike Knudsen** (RAGTIMER) sent us the Polish national anthem in *UltiMuse* format. **Jim Buck** (COCOROGUE) submitted "The Wind Beneath My Wings" in *UltiMuse* format. **Jeff Blower** (SEBJMB) uploaded a viewer program for VEF pictures that also includes a slide show and print options. **Phil Zeigler** (PHILZEIGLER) gave us a utility to view GIF images written by Vaughn Cato. It supports dithering, color addition, magnification and gray scales of eleven shades.

In the Programmers Den Brian Wright uploaded a 6809 disassembler originally for UNIX systems, a port of the ANSI C `vsprintf` and `vfprintf` functions written by Robert A. Larson, and a message from Greg Law explaining BASIC09's "Subscript Out of Range Error" and the use of the `BASE` command.

Tim Koonce gave us a text file describing one way to deal with large virtual data spaces in OS-9. **Zack Sessions** (ZACKSESSIONS) gave us a documentation file covering installing the Developers System and C Compiler to a single disk drive.

In the Tutorials and Education section **Mike Stute** (GRIDBUG) gave us some additional chapters to *Hitchhiker's Guide to C*, a beginners tutorial to programming with the C language.

CoCo Sig

In the CoCo 3 Graphics section **Dave Willcoxen** (DAVEMAN) posted a program to show fractals by a given angle creating some very nice snowflakes. **Robert Louden** (KURSE) gave us a program to effectively increase the vertical resolution of the CoCo 3 so Macintosh graphics images can be viewed at half their size for use with *View Master*.

Erik Swenson (ERIKS) uploaded several *MAX* sound samples of Rodney Dangerfield. **Tim Sherfy** (RUSHFAN) posted some 5-level digitized images of the rock group Rush. **Richard Trasborg** (TRAS) submitted some animated images of Terri Lynn Doss and a woman winking. **Dan Shargel** (TRIUMPH) posted a graphics image of the logo from "Love and Rockets."

In the Utilities & Applications section John Beveridge gave us a utility that extracts files from several archive formats, including all CoCo archive file types and some MS-DOS archive file types. **Bryan Stephens** (BRSTEPHENS) posted an update or *DIR2*, a resident disk utility that can send a directory to either an 80-column screen or the printer. **Robert Pierce** (RPIERCE) uploaded a fast variable mapper utility for use with BASIC programs. **James Wilcox** (2USER) posted an interesting little utility that simply clears the screen, but in a most unusual manner.

In the Hardware Hacking section **Jim Pogue** (JIMPOGUE) uploaded a text file describing how to make a low-cost internal memory expansion for the *MC-10*.

In the Games section James Wilcox posted an arcade-type game made specifically to run on a BBS called *Scrambler*.

In the Music and Sound section **Gary McCarty** (BANDMAN) uploaded a musical rendition of "Johnny B. Goode" by Chuck Berry and "I Wanna Hold Your Hand" by the Beatles. **Mike Miller** (BEATER) posted "Sittin' on the Dock of the Bay" by Otis Redding and a text file detailing how to use Lyra with the PSS-480, along with two sample Lyra files. **Donald Jereczek** (DONJERE) gave us "True Colors" by Cyndi Lauper for Orchestra-90.

Airtight software that shows you how to make BASIC programs virtually crashproof

The Invincible Duplicator

Duplicator
Duplicator

By Marc Campbell

I have always been fascinated and impressed with the technique behind "airtight software." The term applies to any program that just can't be crashed, regardless how hard a mischievous user tries. Airtight programming gives its software the user-friendly professional touch and, if built on the foundation of a good idea, makes for a very marketable piece of software.

One of the most popular misconceptions held in the CoCo Community is that airtight code is a reserved commodity, barred to all programmers except those with error- and BREAK-trapping routines at their disposal (namely CoCo 3 and machine language users). Regardless of any myths you may have heard, diehard CoCo 1 and 2 Color BASIC fans can perform similar stunts. While these techniques dabble with machine language, require some technical knowledge of the Color Computer, and rely heavily upon the programmer's ability to predict the user, they occupy only a small portion of BASIC memory because CoCo's built-in ROM routines do most of the work.

The utility, *The Duplicator*, is a BASIC program that runs on any disk-based Color Computer with at least 32K. This utility makes a backup copy of any formatted disk and, at no extra cost, is a full-fledged tutorial on making BASIC programs virtually 100-percent crashproof. (I won't tell if you won't.)

Marc Campbell, a self-taught programmer, is a student at Ephrata Senior High School. His computing has grown into more than a hobby, as he has seen several of his programs in print and is marketing others through his own software house.

How To Use The Program

When *The Duplicator* is loaded and run, you are asked to input the source drive and the destination drive. Put the disk to be

duplicated in the source drive and the disk that is to be the backup copy in the destination drive. If you specify the same drive as both source and destination, you are prompted to switch disks after your CoCo's memory is filled with disk data. Press any key to continue.

The computer reads a sector of the disk and stores its contents in memory. This process continues until 90 sectors (5 tracks) have been read and stored. Your CoCo writes each of the stored sectors to the destination disk and then reads the next five tracks of the source disk into memory. After seven such passes, the destination disk is an exact replica of the source disk. You can either back up another disk or quit at this point.

If any errors are encountered, the program reports them and temporarily stops. You can either continue, thereby ignoring the error completely, or rerun the program. If you continue the backup process, the duplicate has the same error.

The BREAK key does not stop the program unless it is pressed while the computer is waiting for keyboard input. In this case, a subroutine is called that lets you either rerun or exit the program.

If you exit or press Reset at any time during operation, *The Duplicator* cold-starts your CoCo. The program and any disk data in memory is completely erased.

Pretty impressive, huh? Sure, the idea of a disk backup utility is a CoCo cliche in its own right, but BREAK-, Reset- and error-trapping on the Color Computer 1 and 2 are breaths of fresh air for an otherwise dull BASIC program. You'll also notice the program only takes up a little more than 1K. Let's take a look at how it's done.

Making Predictions

When writing airtight code, you must assume the user is going to try every method in the book to stop your program in its tracks. We all know the average Color Computer enthusiast is much too sportsmanlike to stoop to such base practices, so let's pretend we're thoroughly rotten Apple or Atari addicts for the time being.

Your task as the programmer is to determine where the user is going to strike and to provide your BASIC creation with a counterattack. I reasoned that *The Duplicator* can be crashed when the source and destination drives are defined, when the BREAK key is pressed, when the Reset button is pushed, and when the computer encounters an error. Therefore, I added the following traps and precautions to my program:

Disable Reset Button (Line 1): By poking 0 into Memory Location 113, the Reset button causes a true cold start instead of a glorified break.

Disable BREAK Key (Line 1): The remaining pokes in Line 1 implement a machine language routine that bypasses a break under nearly all conditions. This routine causes the BREAK key to generate ASCII Value 3 instead of generating the value band also causing a break. It does not work, however, when a disk directory is being displayed or when the programmer uses `EXEC 44539` instead of `INKEY$` to wait for a keypress. Nevertheless, I chose it anyway because I can work around the shortcomings.

Sure, the idea of a disk backup utility is a CoCo cliche in its own right, but BREAK-, Reset- and error-trapping on the Color Computer 1 and 2 are breaths of fresh air for an otherwise dull BASIC program.

Trap for Illegal Drive (Lines 3 and 4): A simple `IF/THEN` check prevents the user from specifying an illegal drive, which eliminates potential DN Errors.

`DSKCON` vs. `DSKI$` and `DSKO$` (lines 7 through 11 and Line 14): The built-in machine language subroutine `DSKCON` performs the same function as the Disk BASIC commands `DSKI$` and `DSKO$` at about the same speed. Therefore, did I choose `DSKCON` to be overly technical? Not really. First of all, `DSKCON` can write the disk data to any accessible memory locations, while `DSKI$` and `DSKO$` are confined to available string space. Secondly, `DSKCON` does not stop for disk errors unless you specifically program it to do so. (Talk about the classic turned tables.) With only one BASIC line that peeks at Memory Location 240, disk errors may be either ignored or corrected without ever leaving the program. `DSKCON` crushes many bugs with one stone.

Cold Start (lines 13 and 17): Since most of your CoCo's memory contains disk information, any exit triggers a cold start to completely erase memory.

`INKEY$` vs. `INPUT` (Line 16): When you are asked to specify the source and destination drives, the computer is in an `INKEY$` loop instead of `INPUT`. (The statement `POKE &HA56A` prints the cursor while in an `INKEY$` loop; `&HC1` to the same location restores `INKEY$` to normal.) I chose this method because of several possible problems: `INPUT` allows the user to enter large numbers, negative numbers, or even text strings of well over 200 digits or characters. While an OV Error, a Redo? message, or the program's own illegal device trap can catch a wild number or string, the display can be mismatched and sloppy-looking. An `INKEY$` loop only looks for one keypress before ending, and any letters or special characters are converted to zero with the `VAL` function.

BREAK Trap (lines 16 and 17): If BREAK is pressed whenever the user is asked to press any key, the program jumps to a BREAK-handling subroutine that allows you to either restart the program or quit. This BREAK trap works only if the BREAK key is demoted to generate an ASCII code with the BREAK disable routine in Line 1.

A Poor Substitute

Just so you aren't mislead with false delusions of grandeur, using machine language ROM routines such as `DSKCON` is not pure, bona fide error-trapping. Clearly for all practical purposes the only way to trap errors in your BASIC programs is to have an integrated `ON ERROR GOTO` command. However, if you are looking for a way to bypass errors caused by poor data I/O transactions or by a malicious user, ROM routines offer an excellent solution.

`DSKCON`'s entry address is stored in most/least significant byte format at locations $C004 and $C005. By peeking at $C004, multiplying this number (the most significant byte) by 256, and adding to the product the contents of $C005 (the least significant byte), `DSKCON`'s execute address is 55135.

`DSKCON` accesses six other memory locations (234 through 240) for its parameters as well:

- DCOPC; PEEK(234) contains the opera-

tion code. 0 restores the head to Track 0; 1 indicates no operation; 2 reads a sector; and 3 writes a sector.

- DCDRV; PEEK(235) contains the drive number (0 through 3).
- DCTRK; PEEK(236) contains the track number (0 through 34).
- DCSEC; PEEK(237) contains the sector number (1 through 18).
- DCBPT; PEEK(238)*256+PEEK(239) contains the memory location of a 256-character disk data buffer. DSKCON returns information from the disk to this buffer or writes the information stored in the buffer to disk, depending on DCOPC's value.
- DCSTA; PEEK(240) contains the drive status. A 128 indicates a Drive Not Ready Error; a 64 indicates the disk is write-protected; a 32 indicates a write fault; a 16 indicates an error in the Seek routine or the specified record was not found; an 8 indicates an error in the Cyclic Redundancy Check (CRC); a 4 indicates lost data; and a 0 indicates no error was found.

Programmers can change these parameters by poking a new value into the parameter's memory address. Here is how the disk backup routine uses DSKCON to perform its task:

Line 7: The Read Sector operation code is selected by poking 2 into Location 234. The source drive number, track number and sector are poked into locations 235 through 237. Finally the current buffer pointer is determined and poked into 238 and 239. Now when we execute DSKCON, it works within the parameters we have just defined.

Line 8: DSKCON is executed and we check the status of the drive by peeking at Location 240. If a zero is returned, no error has occurred. In the event that PEEK(240) is greater than zero, the program jumps to an error-handling subroutine at Line 14.

Line 10: The Write Sector operation code is selected by poking 3 into Location 234. All of DSKCON's parameters are set as in Line 7.

Line 11: DSKCON is executed and the check for errors is made once again.

As you can see, it takes only a little prediction and technical know-how to write your own airtight programs in plain vanilla BASIC. Don't let those nasty Brand-X computer users tell you Disk BASIC is for the birds; they're just jealous. If you are interested in using DSKCON and other built-in ROM routines with your own programs, refer to your Color BASIC and disk drive manuals. A warning to the neophyte: Being well-versed in machine language is a definite asset when using your Color Computer's ROM routines.

(Questions or comments concerning this article may be addressed to the author at 266 Riverview Drive, Ephrata, PA 17522. Please enclose an SASE when requesting a reply.)

❑

The listing: DUPLICAT

```
0 'THE DUPLICATOR COPYRIGHT (C)
   1988 BY MARC CAMPBELL
   COPYRIGHT 1989  FALSOFT, INC
1 POKE&H71,&H0:POKE&HF8,&H32:POK
E&HF9,&H62:POKE&HFA,&H1C:POKE&HF
B,&HAF:POKE&HFC,&H7E:POKE&HFD,&H
AD:POKE&HFE,&HA5:POKE&H19A,&H39:
POKE&H19B,&H0:POKE&H19C,&HF8:POK
E&H19A,&H7E:FORQ=1TO2:NEXT
2 VERIFYON:CLS:PCLEAR8:A=0:B=4:P
RINTSTRING$(32,128)TAB(9)"THE DU
PLICATOR":PRINT"   FLOPPY DISK B
ACKUP UTILITY":PRINT"(C) MCMLXXX
VIII BY MARC CAMPBELL"STRING$(32
,128)
3 POKE&HA56A,&HB1:PRINT@192,"":P
RINT@192,"SOURCE DRIVE (0-3)? ";
:GOSUB16:SD=INT(VAL(A$)):IFSD<0O
RSD>3THEN3ELSEPRINTSD
4 PRINT@224,"":PRINT@224,"DESTIN
ATION DRIVE (0-3)? ";:GOSUB16:DD
=INT(VAL(A$)):IFDD<0ORDD>3THEN4E
LSEPRINTDD:PRINT:PRINTSTRING$(32
,128):POKE&HA56A,&HC1
5 IFSD<>DD THENPRINT@453,"PRESS
ANY KEY TO BEGIN":GOSUB16
6 FORP=1TO7:IFSD=DD THENPRINT@45
3,"INSERT SOURCE DISKETTE":GOSUB
16
7 POKE234,2:POKE235,SD:X=3584:FO
RT=A TO B:FORS=1TO18:POKE236,T:P
OKE237,S:M=INT(X/256):N=X-M*256:
POKE238,M:POKE239,N:X=X+256:IFX=
15872THENX=21504
8 PRINT@352,"READING TRACK"T"SEC
TOR"S:EXEC55135:IFPEEK(240)=0THE
NNEXTS,T ELSEGOSUB14:NEXTS,T
9 IFSD=DD THENPRINT@452," INSERT
 DESTINATION DISK":GOSUB16
10 POKE234,3:POKE235,DD:Y=3584:F
ORT=A TO B:FORS=1TO18:POKE236,T:
POKE237,S:M=INT(Y/256):N=Y-M*256
:POKE238,M:POKE239,N:Y=Y+256:IFY
=15872THENY=21504
11 PRINT@384,"WRITING TRACK"T"SE
CTOR"S:EXEC55135:IFPEEK(240)=0TH
ENNEXTS,T ELSEGOSUB14:NEXTS,T
12 A=B+1:B=A+4:NEXTP
13 PRINT@448,"DISK IS BACKED UP;
 ANOTHER (Y/N)";:GOSUB16:IFA$="Y
"ORA$="y"THENRUNELSEEXEC40999
14 PRINT@448,"":IFPEEK(240)=128T
HENPRINT@455,"INPUT/OUTPUT ERROR
"ELSEIFPEEK(240)=64THENPRINT@454
,"WRITE-PROTECTED DISK"ELSEPRINT
@458,"SYSTEM ERROR"
15 PRINT@483,"(1) CONTINUE OR (2
) RESTART";:GOSUB16:IFA$="1"THEN
PRINT@483,STRING$(27,32);:RETURN
ELSERUN
16 A$=INKEY$:IFA$=""THEN16ELSEIF
A$=CHR$(3)THEN17ELSERETURN
17 POKE&HA56A,&HC1:PRINT@448,"":
PRINT@452,"(1) RESTART OR (2) QU
IT?":GOSUB16:IFA$="1"THENRUNELSE
EXEC40999
```

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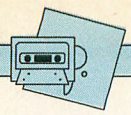

A new approach to PSETting numbers without using coordinates

The Graphics Corner
Part II: Scrolling the Screen

By William P. Nee

Last month we used every point on the screen as the *x* and *y* in an equation, and PSET the color of each point according to the results of that equation. This month we'll use a different approach, forgetting about *x* and *y* coordinates. Instead, we'll use numbers in a one-dimensional array (a row of numbers) to generate new values for the array and PSET those numbers. As with most computer programs that use an array to store values, a second temporary array is needed to keep track of new values.

Imagine your video screen as a giant grid composed of 127 points across and an endless number going down. In the program *Scroll Demo* a color value of 0 to 3 is assigned to any point in the first row and the computer takes care of all the rest — permanently. The color for every point in the next row is based on two values — the total value of the three points just above it (left, middle and right) and a color code that assigns the point to a color based on the total value. The values for each point in the row then generates the values for the next row, and so forth.

A demonstration of the basic program clears everything up. Listing 1 gives you an example of how it works. The color code used is 0231123003 (Line 100). Since any point can have a value from 0 to 3, three points added together can have a value from 0 to 9. Therefore, the color code must always be 10 digits long (0 to 9), with each number 0 to 3. Some color codes only generate a few rows, some fill the screen, and some appear to go on forever. There's no way to tell how long code keeps generating, but after a while you recognize those patterns that die off quickly and those that hang around.

Try changing Line 20 in Listing 1 to FOR V=0 TO 191, so the display goes to the bottom of the screen and then re-runs the program. There are two problems: It takes too long to show the entire display, and it is unclear where the display actually ends. Does it keep going and, if so, for how long? Let's solve the second problem first.

To scroll the entire screen up one row in BASIC takes forever, even with a GET-PUT, so we'll write our own machine language

Listing 1: SCRLDEMO

```
0 ' COPYRIGHT 1989  FALSOFT,INC
4 DIM CC(9),A1(127),A2(127)
5 FOR I=0 TO 9:READ CC(I):NEXT
6 A1(63)=2:A1(64)=2
10 PMODE 3,1:PCLS:SCREEN 1,0
20 FOR V=0 TO 60
30 FOR H=1 TO 126
35 N=A1(H-1)+A1(H)+A1(H+1)
36 A2(H)=CC(N)
37 NEXT H
40 FOR H=1 TO 126:HH=H+H
45 A1(H)=A2(H)
46 PSET(HH,V,A1(H)+1)
47 NEXT H
50 NEXT V
99 GOTO 99
100 DATA 0,2,3,1,1,2,3,0,0,3
```

Bill Nee bucked the "snowbird" trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo.

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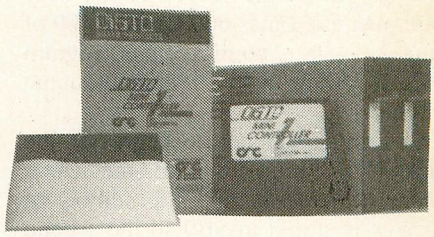

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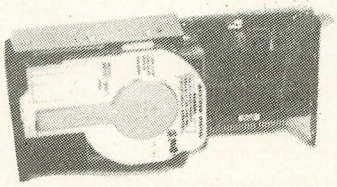

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program that works in any PMODE. Since we just want to move chunks of data, we'll do it by bytes and not worry about the individual bits. Generally, we'll take the first two bytes from the second row and move them up one row, move the next two bytes over up one row, etc. Lines 660 through 800 of Listing 2, SCROLL, comprise the program for this. It works quickly, even without the fast poke.

The first graphics byte begins at the address in Location $BA/BB, but where does the next row begin? The number of bytes/row is stored in $B9 so the second row must begin at the location in $BA/BB plus the value in $B9; store this location in Register X and the $BA/BB location in Register U. Now load Register D with the contents of the Register X address (first two bytes, second row), increase the Register X address by two (next two bytes over), store Register D in the Register U address (first two spaces, first row), and increase the Register U address by two (next two spaces, first row). The address in $B7/B8 is the end of graphics so keep scrolling until Register X equals the value in $B7/B8.

Now clear out the bottom row. Since we are at the end of graphics, subtracting the number of bytes/line from the value in Register X puts us back at the start of the last row. Load Register D with zero, store it in the location in Register X, and increase the Register X address by two. Keep repeating this until you're back to the end of graphics and have finished scrolling the entire screen up one row.

To set each point and incorporate the SCROLL routine, all in the same machine language program, take a look at Listing 2 and follow along. First start with two arrays of 128 bytes each, beginning at Location ARRAY and set all 256 bytes to zero. Next set the row counter to 0, Register U to the array location +1, Register X to the color code location, and the column counter to 1. Load Register B with the total value of the first three numbers in the array. Then load Register A with the corresponding color code, and store that value in the temporary second array. Increase the array counter and column counter by one, get the total of the next three array numbers, get the corresponding color code, and store it in the second array. Continue doing this until you've gone across the row 126 times.

Once you've completed a row, go back and PSET all the points — remember this is a one-dimensional array. The row counter is still 0; set the column counter back to 1, load Register A with the first value in the second array and PSET the color. Increase the column counter, get the next value in the second array and PSET it. Continue doing this until the column counter reaches

Listing 2: SCROLL

```
00100          ORG     $7200
00110 START    LDU     #ARRAY  CLEAR 256 BITS TO 0
00120          LDX     #128
00130          LDD     #0
00140 CLR      STD     ,U++
00150          LEAX    -1,X
00160          BNE     CLR
00170          RTS
00180          CLRA
00190 LOOP3    STA     ROW
00200          LDU     #ARRAY+1
00210          LDX     #CODE
00220          LDB     #1
00230 LOOP1    STB     COL
00240          LDB     -1,U    GET VALUE OF TOP 3 NEIGHBORS
00250          ADDB    ,U
00260          ADDB    +1,U
00270          LDA     B,X     GET CODE VALUE
00280          STA     +128,U  STORE CODE VALUE
00290          LEAU    +1,U    NEXT ARRAY
00300          LDB     COL
00310          INCB
00320          CMPB    #126    ALL THE WAY ACROSS-1
00330          BLS     LOOP1
00340          LDU     #ARRAY+1
00350          LDY     #$92E5
00360          LDB     #1
00370 LOOP2    STB     COL
00380          LDA     +128,U  NEW VALUE
00390          STA     ,U+     PSET IT
00400          LDB     #$55
00410          MUL
00420          STB     $B5
00430 PSET1    LDA     ROW
00440          LDB     $B9
00450          MUL
00460          ADDA    $BA     GET BYTE
00470          TFR     D,X
00480          LDB     COL
00490          LSRB
00500          LSRB
00510          ABX
00520          LDA     COL
00530          ANDA    #3
00540          LDA     A,Y
00550          ANDA    $B5
00560          ORA     ,X
00570          STA     ,X      PSET THE BIT
00580 CONT1    LDB     COL
00590          INCB
00600          CMPB    #126    ACROSS YET?
00610          BLS     LOOP2
00620          LDA     ROW
00630          INCA
00640          CMPA    #191    DOWN YET?
00650          BLS     LOOP3
00660 SCROLL   LDB     $B9     BYTES/LINE
00670          LDU     $BA     GRAPHICS START
00680          LDX     $BA
00690          LEAX    B,X     2D ROW OF GRAPHICS
00700 L1       LDD     ,X++    MOVE UP ONE ROW
00710          STD     ,U++
00720          CMPX    $B7     END OF GRAPHICS
00730          BLO     L1
00740          LDB     $B9
00750          NEGB
00760          LEAX    B,X     BACK TO BEGINNING OF LAST ROW
00770          LDD     #0
00780 L2       STD     ,X++    CLEAR OUT LAST ROW
00790          CMPX    $B7     END OF GRAPHICS
00800          BLO     L2
00810 FINAL    LDA     #191    DO JUST LAST ROW
```

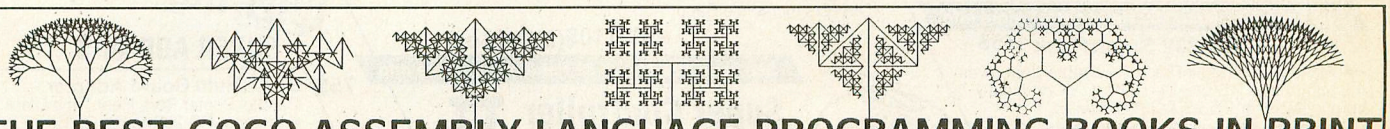
```
00820           STA     ROW
00830           LDU     #ARRAY+1
00840           LDX     #CODE
00850           LDB     #1
00860 LOOP4     STB     COL
00870           LDB     -1,U
00880           ADDB    ,U
00890           ADDB    +1,U
00900           LDA     B,X
00910           STA     +128,U
00920           LEAU    +1,U
00930           LDB     COL
00940           INCB
00950           CMPB    #126
00960           BLS     LOOP4
00970           LDU     #ARRAY+1
00980           LDY     #$92E5
00990           LDB     #1
01000 LOOP5     STB     COL
01010           LDA     +128,U
01020           STA     ,U+
01030           LDB     #$55
01040           MUL
01050           STB     $B5
01060 PSET2     LDD     #$17E0  IST BYTE IN LAST ROW
01070           ADDA    $BA
01080           TFR     D,X
01090           LDB     COL
01100           LSRB
01110           LSRB
01120           ABX
01130           LDA     COL
01140           ANDA    #3
01150           LDA     A,Y
01160           ANDA    $B5
01170           ORA     ,X
01180           STA     ,X
01190           LDB     COL
01200           INCB
01210           CMPB    #126    END OF ROW
01220           BLS     LOOP5
01230           JSR     [$A000] ANY KEY PRESSED?
01240           LBEQ    SCROLL  IF NOT, BACK TO SCROLL
01250           RTS             ELSE RETURN TO BASIC
01260 ROW       RMB     1
01270 COL       RMB     1
01280 CODE      RMB     10
01290 ARRAY     RMB     256
01300           END     START
```

126. When it does, you're finished with that row.

Now increase the row counter by one and repeat the entire process until the row counter reaches 191, the bottom of the screen. When you've PSET the entire screen the scroll portion of the program goes into affect, moving every row up one, leaving just the last row for us to PSET. So this time set the column counter to 1 and the row counter to 191. Again, get the total of the first three numbers in the array, the corresponding color code value, and store it in the second array. Continue this until the column counter reaches 126, then go back to the start of the row, get each new color value from the second array, and PSET it.

Graphics for the last line in PMODE 3,1 must begin at $17E0 — that's why PSET1 and PSET2 are different. Finally you need to give the user a chance to stop the program. Line 1230 returns to BASIC if any key is pressed; if no key is pressed, it goes back to scrolling. After you've finished entering Listing 2, check for any errors by typing A/NO/NS/WE. When it's error-free, assemble the program as SCROLL/BIN.

Now we need a BASIC program to run everything — Listing 3. First load the *Scroll* machine language program if necessary. Since the ML program starts at $7200, keep all variables one below that location. Line 20 clears ARRAY1 and temporary ARRAY2 to 0. The first array starts at $730B and your color code is stored at $7301. The program reads the color code and pokes it into the proper location. Next pick the points and values you want the program to start with. In Line 40 the 63rd and 64th points in the array (corresponding to the top center of the screen) are given a value of 2. These points are not PSET since the ML program just uses those values to compute and PSET Row 0. Finally the program sets PMODE 3,1, SCREEN 1,0, then executes the rest of the ML program. The program keeps running



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until you press any key.

After you've typed the program, save it first as SCROLBAS before running it since it automatically loads the machine language program for you. To use the fast poke (POKE 65495,0 for CoCos 1 and 2 or POKE 65497,0 for the CoCo 3), put it just before Line 60. Put the slow poke (POKE 65494,0 for CoCos 1 and 2 or POKE 65496,0 for the CoCo 3) just after Line 60.

Experiment with different color codes, and try using different points with different values. After a while you get a feel for which type of display is going to end quickly; the hardest to find are those that go on indefinitely. Some color codes I use, along with array values, are shown in Table 1. The programs can be modified for PMODE 4, but most displays are not as interesting.

Next month we'll incorporate a two-dimentional array and a machine language program, using the upper 32K RAM to store array values — no small task, but it is worth it.

(Questions or comments concerning this tutorial may be directed to the author at Route 2, Box 216C, Mason, WI 54856. Please enclose an SASE when requesting a reply.) ❑

Listing 3: SCROLBAS

```
0 ' COPYRIGHT 1989  FALSOFT,INC
5 IF PEEK(&H7200)<>&HCE THEN LOA
DM"SCROLL"
10 CLEAR 200,&H7200
20 EXEC &H7200:A1=&H730B:CC=&H73
01
30 FOR I=0 TO 9:READ V
31 POKE CC+I,V:NEXT
40 POKE A1+63,2:POKE A1+64,2
50 PMODE 3,1:PCLS:SCREEN 1,0
60 EXEC &H7210
70 GOTO 70
80 DATA 0,2,3,1,1,2,3,0,0,3
```

Table 1

Color Code	Array Values
0231123203	A1+63=2:A1+64=2
0230011133	A1+63=3:A1+64=3
0120330210	A1+63=1:A1+64=1
0010332321 or 3310013031	FOR N=0 TO 63:Z=N AND 3 POKE A1+N,Z:POKE A1+127-N,Z NEXT
2120203312	A1+63=1:A1+64=1

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Relating problems to everyday situations

Learning About Ratios

By Steve Blyn
Rainbow Contributing Editor

This month's program presents a way to deal with the topic of ratio, a verbal problem area most appropriate to intermediate students in grades five through eight. Verbal problems often give students an unusually difficult time until they are put into practical, real-life situations. The computer may also help your child/students deal more easily with this topic.

Ratio is a means of comparing numbers. Let's consider an example: There are two brothers — Adam is 12 years old and David is four. We can subtract the younger (smaller) age from the older (larger) age (12-4=8) to conclude that Adam is 8 years older than David. On the other hand, we can divide the smaller number into the larger (12/4 = 3), to conclude that Adam is three times as old as David.

When we compare two quantities using division, we are finding out the ratio. The ratio of Adam's age to David's is 12/4 or 3/1. Another method of writing the ratio 3/1 is 3:1. The ratio, therefore, of Adam's age to David's is 3:1, and the ratio of David's age to Adam's is 1:3.

There are two rules for computing ratio examples:

- To find the ratio of two quantities, divide the first quantity by the second.
- To compare two quantities by the ratio method, both quantities must be expressed in the same unit. Since a ratio represents a fraction, both terms of the ratio can be multiplied or divided by the same number, without changing the original value of the ratio. For example: 12/15 = 4/5, or 12:15 = 4:5.

An imaginary school project is taking place to select the favorite fruit of the students from among apples, bananas and peaches. Rather than asking every student in the entire school, a small sample is taken. The ratio of each fruit to the small sample can then be computed. The number of students in the entire school who would have selected each fruit can then be computed from the original ratio. For example: In a group of 40 students, eight preferred apples, 20 preferred bananas and 12 preferred peaches. How many would prefer apples if the school population were 800?

Since, in this example, we are only interested in apples, we need only compute the ratio within the sample for apples, 8/40 = 1/5.

The ratio for apples is 1:5. This is the ratio figured for our sample group and it is assumed to be true, as well, for the entire school.

We can now figure out the total number of students schoolwide expected to prefer apples by solving for *X* in the equation 1/5=*X*/800. Solving for Variable X, we can safely guess that about 160 students schoolwide would select apples as their favorite.

Our program proceeds in this manner: Each example chooses new amounts for the sample, the number preferred for each fruit, and the total school population. The program is carefully written to choose variable numbers that work out evenly. Our numbers reduce to eighths, but you may alter these variables to adjust for other levels of difficulty.

Problem-solving techniques should be addressed from the very beginning of the school experience. Unfortunately this is not always the case — just before standardized tests are administered, there is always a flurry of activity in the classroom to teach the children how to solve verbal math problems. Lack of experience causes many children difficulty with this area of mathematics. Relating the problems to everyday situations is very helpful and can make the transition to the more abstract mathematics of the higher grades a great deal less traumatic. ❑

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: RATIOS

```
10 REM"LEARNING ABOUT RATIO"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1989"
30 X$=STRING$(32,159):Q=RND(-TIM
ER):A=RND(10):A=A*8
40 CLS:S=S+1:PRINT@484,"#=";S;
50 PRINT@501,"R=";CR
60 N=(A+A)*RND(3):IF N<100 THEN
RUN
70 PRINT@0,A;"STUDENTS AT THE AD
AMS SCHOOL";
80 PRINT"TOOK PART IN A SURVEY T
O CHOOSE THEIR FAVORITE FRUIT."
90 PRINT@96,X$;
100 PRINT"THE CHART BELOW SHOWS
RESULTS."
110 R=RND(3):IF R=1 THEN X=A/8:Y
=3*(A/8):Z=A/2
120 IF R=2 THEN X=3*(A/8):Y=A/2:
Z=A/8
130 IF R=3 THEN X=A/2:Y=A/8:Z=3*
(A/8)
140 PRINT@167,"APPLES       ";X
150 PRINT@199,"BANANAS      ";Y
160 PRINT@231,"PEACHES      ";Z
170 PRINT@256,X$;:RR=RND(3):IF R
R=1 THEN Y$="APPLES":XX=X
180 IF RR=2 THEN Y$="BANANAS":XX
=Y
190 IF RR=3 THEN Y$="PEACHES":XX
=Z
200 PRINT"IF THERE ARE";N;"STUDE
NTS IN THE";
210 PRINT"SCHOOL,HOW MANY WOULD
YOU EXPECTTO CHOOSE ";Y$;:INPUT
J
220 K=(XX*N)/A:PRINT@384,X$;
230 IF J=K THEN PRINT@426,"CORRE
CT":CR=CR+1:PLAY"O3L50CEDFGGGG"
240 IF J<> K THEN PRINT@420,"SOR
RY,";K;"IS THE ANSWER":SOUND 100
,4
250 EN$=INKEY$:IF EN$=CHR$(13) T
HEN 40 ELSE IF EN$="E" THEN CLS:
END:ELSE 250
```

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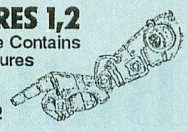
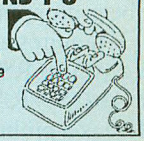


TELECOMMUNICATIONS 1-3

T1 - Haysae, Kermit, Mterm
T2 - Cobster Terminal Package
T3 - Mikeyter Terminal Package



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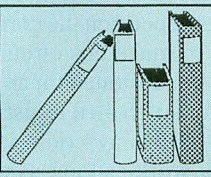
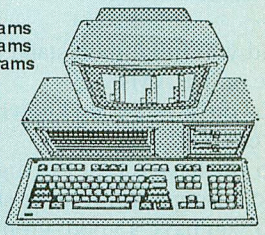


EDUCATION 1-4

E1 - 12 Programs For Young Kids
E2 - 12 Programs For High School Kids
E3 - 11 Programs Teaching The Coco'S Commands
E4 - 5 Graphics Programs About Australia

GRAPHICS 1-4

GR1 - 12 Basic Graphic Programs
GR2 - 12 Basic Graphic Programs
GR3 - 9 Coco 3 Graphic Programs
GR4 - 22 Coco Max Pictures
GR5 - 22 Coco Max Pictures
GR6 - 22 Coco Max Pictures
GR7 - 15 Coco Max Pictures
GR8 - 22 .Bin Pictures
GR9 - 22 .Bin Pictures
GR10 - 14 Large .Bin Pictures
GR11 - 8 Mge Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures



HOME MANAGEMENT 1-4

• 12 Programs Each Disk/Tape •

H1 - Checkbook, Database, Word Processor, +
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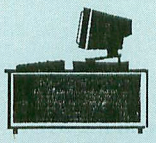
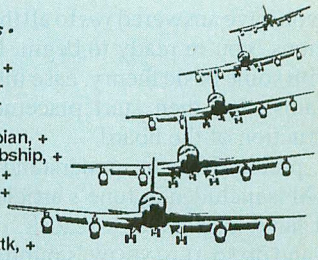
H3 - Finance, Int. Rates, Stocks, +
H4 - Spelling Fix, Spelling Checker, +

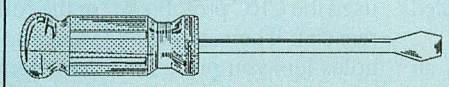


GAMES 1-11

• Each Disk/Tape Contains 12 Programs •

GA1 - 3Dtictac, Missle, Poker, Tycoon, +
GA2 - Chess, Motojump, Rider, Slots, +
GA3 - Battship, Golf, Lander, Robots, +
GA4 - Abm, Cartel, Subchase, Trek, +
GA5 - Blackjack, Laser, Raceway, Utopian, +
GA6 - Kings, Navyguns, Poolgame, Subship, +
GA7 - Connect4, F-16, Life, Mazeland, +
GA8 - Chute, Football, Othello, Slither, +
GA9 - Civilwar, Flight, Prix, Stock, +
GA10 - Cave, Fly, Pedro, Scramble, +
GA11 - Bunkers, Craps, Gunner, Nukeattk, +

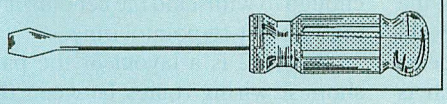




UTILITIES 1-8

• 12 Programs Each, 1-4 Require Disk •

U1 - Backup35, Diskzapr, Romcopy, Timer, +
U2 - Customize, Diskfix, Disktest, Multback, +
U3 - Diskaid, Dsklibry, Mldata, Playmac, +
U4 - Macpix, Stat-Log, Unarc, Unmaster, +
U5 - Assemblr, Mcbase, Squeezw, Writer, +
U6 - Chr-Ed3, Hgrcolor, Minidos, Updnlist, +
U7 - Head Print With 30 Mini Pictures
U8 - Fig Forth Language With Tutiorial



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M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

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A challenging project for long-time hackers

Building a RAM Disk

By Tony DiStefano
Rainbow Contributing Editor

All you long-time hackers, get your soldering irons out — the challenge is here. This project's final product is a 256K RAM Disk. Not only is this a big project, but it costs some cash.

Let me explain. Apart from the 10 or so support chips and protoboard, the project requires eight 41256 chips. Lately the prices have been dropping, but it will still cost you a bit. It requires a Multi-Pak and I will be giving you an RS-DOS driver for a RAM Disk. An OS-9 RAM Disk is also available.

Here is a preliminary checklist to see if you qualify to start this project. If you answer *no* to any of these questions, think hard before starting.

- Did you fully understand last month's article on DRAMs?
- Do you have a good knowledge of TTL logic circuits?
- Do you have access to a digital probe or an oscilloscope (for trouble-shooting)?
- Do you have a good, grounded soldering iron and can you use it?
- Do you have the patience and money to put this project together?

If you have answered *yes* to all the above questions, you're ready to begin. I'll start off with some basic theory, ease into block diagrams, and then start placement and construction of the board.

A prerequisite to understanding the DRAM is included in June's article. If you don't have it or haven't read it, obtain a copy and do so. (RAINBOW 's publisher has back issues.) The DRAM we are using is the 41256, which requires an 18-bit address. Remember, two to the 18th power is 256K. Look at Figure 1. It is a block diagram of what we are going to build.

You see the eight data lines coming from the CPU. All addressing and data transfers are done via the Data Bus. Three memory locations and latches are needed to store an 18-bit address — two times eight and two more. The CoCo can only transfer eight bits at a time. These are all stored in the latches area in Figure 1. The output of the latches is then fed to a multiplexing circuit. This circuit combines the addresses from the latches and the Refresh counter in such a way that makes it adhere to the DRAM protocol. This is done in the MUX part of the circuit. Also needed in the circuit is the delay mechanism to generate RAS, CAS and the Refresh circuit. This is handled by the Delay part of the circuit.

The Refresh part of this circuit is an eight-bit counter. There are many ways to refresh DRAMS. My way is simple and requires few parts. The 6809 CPU uses a synchronous bus, which means that after every clock there is a CPU access. You know exactly when the CPU will access the bus. I used the opposite of this theory — every time the CPU does not access the RAM disk, a Refresh cycle is initiated and completed. Even when the CPU is accessing the RAM disk, full-speed refresh is being done during at least one cycle out of four; even using the tightest machine code, the CPU does not use the bus 100 percent. This is enough to keep the Dynamic RAM refreshed. The minimum of 256 Refresh cycles within 4ms is respected.

This circuit has many components, but the main theory sections are made up of the above. The actual parts making up this circuit may crisscross. This is normal in design and saves parts. The circuit consists of 18 chips, of which eight are RAM chips and the other 10, support chips. A complete parts list follows:

Part #	Description
U1 to 8	41256 (256K DRAM 150ns)
U9 and U10	74LS374
U11	74LS244
U12	74LS393
U13	74LS138
U14	74LS174
U15	74LS125
U16	74F08
U17	74LS32
U18	74LS14
C1 to C18	.1µF capacitor
C19	10µF, 10 to 25 volts DC

Concerning these parts, all LS chips cannot be replaced by another family. Delayed timings depend on the component delays in order to make this circuit work. The F chip may be subsituted for an ALS or an AS, but not for an LS — it is just not fast enough. The 41256 may come in many numbers, which work as long as they are compatible. As for speed I used 150ns, but 120ns also works. The capacitors used in this circuit are standard decoupling caps. The other cap is a power supply electrolytic cap. You may have to go to several electronics shops to get all the parts.

Apart from the components here, there are a few other things you need. A board is necessary for mounting all these parts. I used the CRC protoboard for the following reasons: The size is right; spacing of the holes lets you place the components anywhere on the board; and you need it for this project. A metal case is available to house the project, and the price is also right.

Next you need a lot of hook-up wire. The small stuff used in wire-wrapping is my favorite. It is small enough to get many wires placed in a tight area and rugged enough to withstand the bending and twisting of point-to-point wiring.

Figure 2 is a layout of the parts. The shortest wiring routes between the chips are achieved. After trying many times, I found that this layout has the least amount of wiring crisscross. Nevertheless, try to keep the wires as short and neat as possible. It is necessary to put all sockets where the chips go, so you will need to pick up a few of them. U1 to U8, U13 and U14 require 16-pin sockets, U9, U10 and U11 require 20-pin sockets, the rest require 14 pins. That's 10 16-pin sockets, three 20-pin sockets and five 14-pin sockets.

Now that we have some sockets, we must first get all of them in their proper places and soldered. When placing the

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

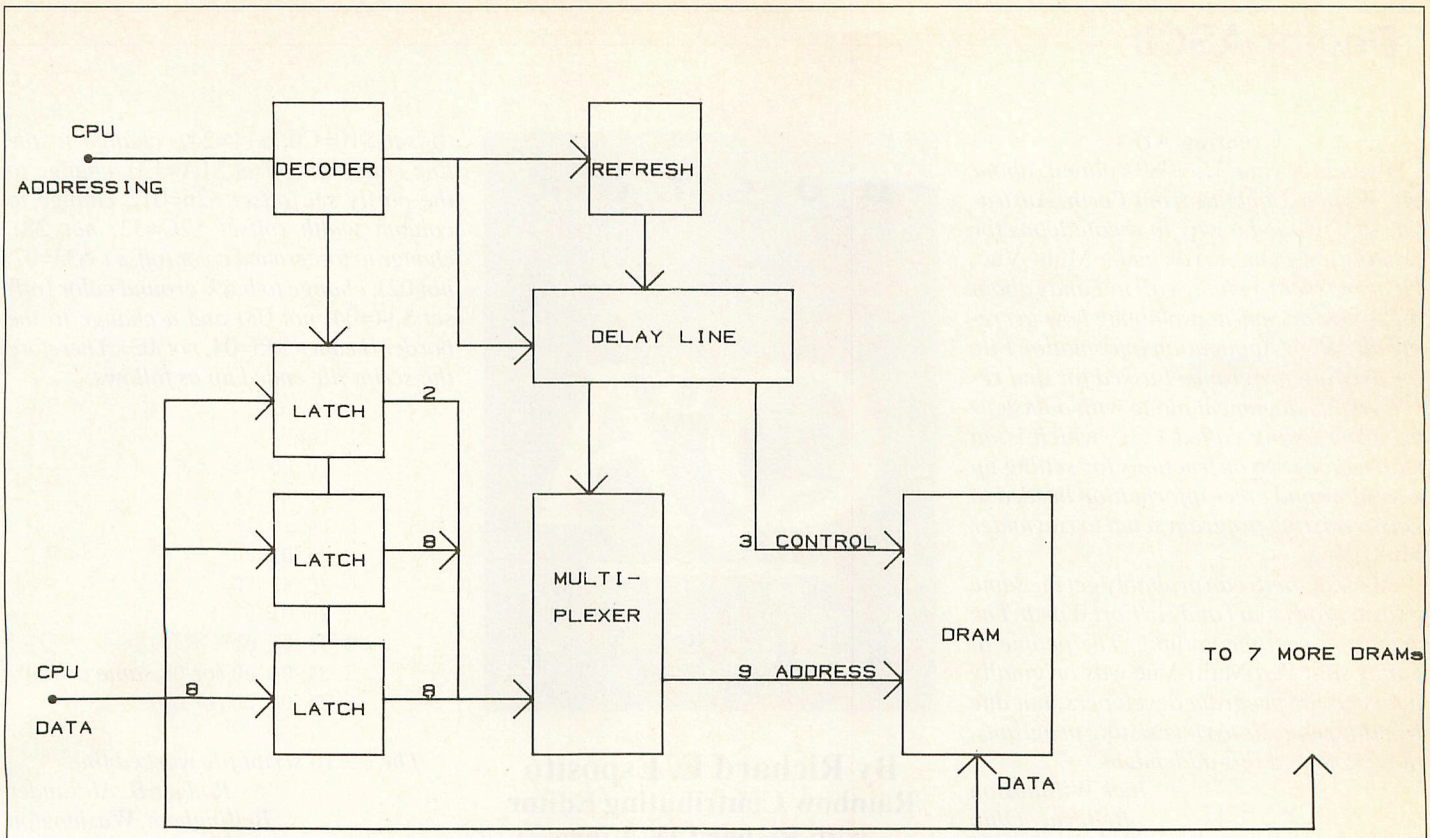


Figure 1

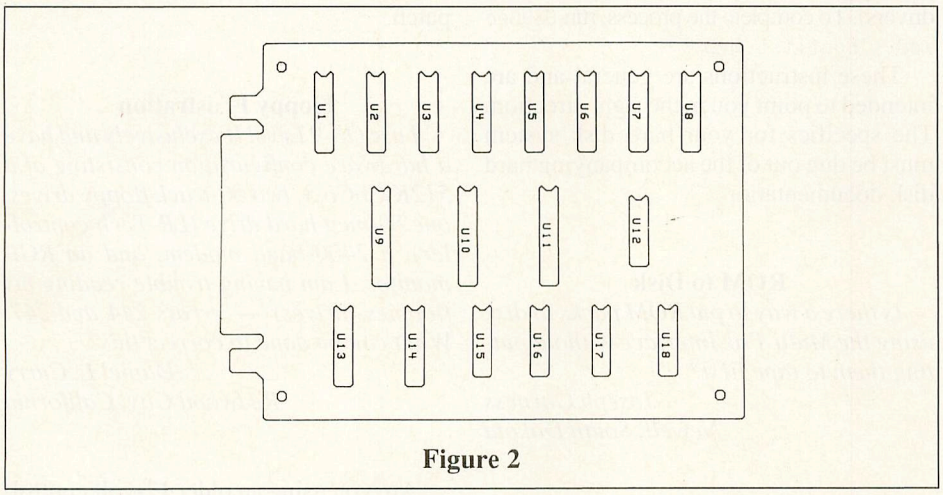


Figure 2

sockets, make sure that all the right sizes are in place as explained above. Then wire up the five volts, and ground using Number 22 solid wire. Do all the five-volt and ground wiring from the top of the board, running the wire between the sockets. Here is a pin requirement list for this step:

Part #	5-Volts	Ground
U1 to U8	Pin #8	Pin #16
U9 to U11	Pin #20	Pin #10
U12	Pin #14	Pin #7
U13 & U14	Pin #16	Pin #8
U15 to U18	Pin #14	Pin #7

After all the power wires are placed, insert a .µ1F capacitor beside each socket. Place them so that one leg of each capacitor lines up with the ground connection of each socket, and the other leg is close to the following pin number. For example, if you were placing a capacitor to U14, one leg would be next to Pin 8 and the other leg would be next to, or as close as possible to, Pin 9. Now run a wire from the free pin of each capacitor to the five-volt pin of each socket. These are known as decoupling capacitors. They prevent the supply voltage from dropping when the chip requires current. This requires the capacitor to be as physicially close to the chip as possible.

When all the wiring is done, check your work. Make sure all the sockets have five volts and ground them. Then if your protoboard has a ground plane on the border, solder a couple of wires to the border from the common ground wires of the sockets. On the edge connector (connected to the CoCo) are two ground pins, 33 and 34. Solder a wire from one of them to the border of your board and the other to the ground pin of a socket in the middle of the board. This ensures that ground is well-distributed. If your protoboard also has grounding tabs like the one CRC sells, make sure they are grounded as well.

Pin 9 of the CoCo edge connector is the five-volt line. Connect one wire to it and to the five-volt pin of Chip U4. Run another wire from Pin 9 to the five-volt pin at U15. Solder the negative side of the 10-µF capacitor to the ground pin of U8. Solder the positive side of this capacitor to the five-volt pin of the same chip. After you have completed this, all chips are properly powered and grounded. These steps are important since problems can develop from improper power distribution.

Next time, I will give you the complete circuit diagram for the RAM disk and how it works. I will also describe common problems and their solutions.

Creating AIFs

I read, in your May '89 column, about Mr. Walter Zambotti from Perth, Australia, who wanted a way to create icons for existing programs to run under Multi-Vue. *I learned from a phone call to Tandy about a 10-page document explaining how to create an AIF or Application Information File for existing programs. I asked for and received this document along with a BASIC09 program listing called* EDIC, *which is an icon editor with instructions for setting up a window and other information needed to get an existing program setup to run under* Multi-Vue.

Mr. Zambotti can probably get the same information from Tandy in Fort Worth. The document cost me nothing. The people at Tandy said that Multi-Vue *was originally intended for program developers, but due to many requests to run existing programs, they produced this addendum.*

Jack Williamson
Bellevue, Ohio

Thanks for the information.

Installing *Multi-Vue*

I recently purchased Multi-Vue *and wanted to install it on my hard drive. There are no instructions for how to do this and I wondered if you could help me.*

David W. Meyer
Moundsville, West Virginia

In order to set up *Multi-Vue* on a hard drive, you need to understand how to use OS9Gen. If you list the supplied BuildMV file, you'll see that you must first take all device descriptors and drivers, and save them to the MODULES directory of the disk used to OS9Gen a new system.

Type mdir on your hard disk system to see which ones you currently have (and still need). From the *Multi-Vue* disk, you need to add term_win.dt and CC3go to this directory. You must then create a text file similar to Bootlist.mv in the supplied MODULES directory containing a list of all files comprising your new boot (including hard disk drivers). To complete the process, run OS9Gen /d0 < bootlist.mv.

These instructions are general and are intended to point you in the right direction. The specifics for your hard disk system must be dug out of the accompanying hard disk documentation.

Richard Esposito is the principal engineer for BDM Corporation. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

DOCTOR Q&A ASCII

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

ROM to Disk

Is there a way to put ROM packs to disk using the Multi-Pak Interface without putting them to tape first?

Joseph Garness
Newell, South Dakota

There is a commercial program, *Multi-Pak Crack*, sold by Zebra Systems, that may help you.

Wrong Prescription

Your suggestion to Ralph Ramhoff in the February '89 RAINBOW, *regarding 80-column RGB Level II boot, does not work. The modpatch script file you listed for* Term *is correct if you look at the* term_win.dt *on the config disk of OS-9 Level II, but when you run* Config *and request the window VDG,* Term *is replaced and the values are changed. At least, when I do a dump on* Term, *I get a change to the header extension (offset* $10=C0, $11=24*), change to the line count bit (offset* $1A=13*), change to the parity set (offset* $26=01*), change to column width (offset* $2C=32, *not* 28*), change to foreground color (offse t* $33=07, *not* 02*), change to back-ground color (offset* $34=04, *not* 03*) and a change to the border (header* $35=04, *not* 03*). Therefore the script file ended up as follows:*

```
L Term
C 10 C0 A0
C 11 24 1A
C 1A 10 18
C 26 01 80
C 2C 32 50
C 30 01 02
C 33 07 01
C 34 04 00 (or 08 same color)
C 35 04 00 (or 08)
```

The CC3IO *script file worked fine.*

Rodger B. Alexander
Bellingham, Washington

My patch assumed you wanted a graphics system. Thanks for the VDG system patch.

Floppy Frustration

I use OS-9 Level II exclusively and have a hardware configuration consisting of a 512K CoCo 3, two 80-track floppy drives, one 80-meg hard drive (LR-Tech controller), a 2400-baud modem, and an RGB monitor. I am having trouble reading my floppies (drives) — errors 244 and 247. What can be done to correct this?

Daniel L. Curry
Redwood City, California

Are you using an older 12-volt controller via the Multi-Pak Interface? If this is the case, you need a newer one, because it cannot reliably handle 2Mhz. It is also possible that you are using low-quality floppy disks, which cannot handle the higher 96-TPI density.

Space Mystery

I have discovered two spaces for 6264 memory chips in the Tandy DMP-132 Printer. The only uses for them, I assume, are for downloading fonts (not likely), or for a 32K printer buffer (most likely). But I can't figure out how to use them from the service manual. All I know is that the printer

must be manufactured by Seikosha. Do you have any ideas?

Robert M. Rosenbrock
Bluffton, Indiana

Your guess is as good as mine. Many manufacturers of printers use one printed circuit board for many printers. This saves on production costs. Even if your guess is correct, the internal code in your printer's ROM might not recognize the extra RAM.

Downloading Directly

How do I download a file directly to disk using a Direct-Connect Modem and Multi-Pak Interface? Do I need additional software/hardware to accomplish this?

Raymond R. Loftus
Watsontown, Pennsylvania

You need the appropriate terminal program. Many are available, both commercial and shareware.

Several Drive Questions

I own a CoCo 2, which I was operating with two old 35-track upright, full-height drives. I recently sold my disk drives, contemplating the purchase of two half-height drives, possibly double-sided. I have several questions.

All my software and data disks are in 35-track format. Will I be able to run my disks (including OS-9) on 40-track disks? If not, how can I change my programs from 35- to 40-track? Does a double-sided drive on a CoCo mean two drives in one (i.e. Drive 0 and Drive 1, together)? Will I have, in fact, four drives if I buy two double-sided drives, or is it like IBM compatibles? If I do have four drives, what cable/controller do I need? Most of my disks are punched, so I can flip them and use both sides. Will this work on these drives?

Erasmo A. Martinez
Watertown, New York

Your 35-track software will run fine without modification. A double-sided drive means it has two heads, each one concurrently accessing its own side of the inserted floppy. OS-9 can access the drive similar to the IBM, in that both sides are logically accessed as one drive. Disk Color BASIC has never been upgraded by Tandy/Microsoft. Some vendors of these drives add a hardware kludge so a double-sided drive looks like two 156K single-sided ones.

I don't recommend this hardware kludge because it wreaks havoc with the proper operation of OS-9. You do not need a new controller, the standard Tandy one supports double-sided drives. If you have an old Tandy cable with missing teeth, you will need to get a new one or at least replace the connectors with ones with all teeth intact. The disks punched on both sides will work fine with Disk Color BASIC, just as they have with older single-sided drives.

Fix for *EDTASM+* Patch

I'm one of those people frustrated by the EDTASM+ *patch. After peeking and poking around, I discovered ROM calls not applicable to my 1.1 ROM. Here is the fix I used to finally get the program to use the disk drive:*

1) `LOADM"`*filename*`"`
2) In the command mode (don't `EXEC` *the program) type and enter the following:*

```
POKE&HE31,&HE9
POKE&HE7E,&HC9
POKE&HE7F,&H52
POKE&HEB2,&H8D
POKE&HF55,&HCC
POKE&HF56,&HAC
POKE&H16CD,&HCF
POKE&H16CE,&H7E
POKE&H1655,&HE3
```

3) `SAVEM"`*filename*`",&HE00,&H37FF,&HE00`

I hope this information will help others with the patch. I don't guarantee this to be a complete fix, but I haven't experienced any problems with it, yet.

William A. Beissert
Carpentersville, Illinois

Thanks for the information.

OS-9 Recognizing Drives

I recently acquired OS-9 Level II and would like to use my disk drive to its fullest. I own one MPI DSDD drive configured as `/d0` *and* `/d2`. *Is there any way I can get OS-9 to recognize it as* `/d0` *and* `/d1`*? Or is this a hardware problem? If it's hardware, can you help? I don't have a 512K upgrade yet. My controller is a Disto Super Controller.*

Dan L. Williamson
East Canton, Ohio

You need to disable the hardware kludge that makes your drive look like two. Then OS-9 Level II can access it properly — as one 360K drive, not two 156K drives.

What's a MODPAK?

Apart from mentioning that it exists, and how to X-mode it, there is virtually no documentation for the `/m1` *OS-9 device driver. How do I use it? Also, what exactly are the often mentioned* `MODPAK` *and* `ACIAPAK`*? Both questions refer to OS-9 Level II.*

Philip Brown
Fal, California

An `/m1` is the device descriptor and `MODPAK` is the device driver for Tandy's Direct-Connect Modem Pack. `ACIAPAK` is the device driver for Tandy's deluxe RS-232 Pak and its third-party clones. Both are used by terminal programs.

Memory Shortage

I am writing a fairly large BASIC *program on my 512K CoCo, and have run out of memory because of the number of variables, etc. Is there a poke or something to allow me to use a larger portion of memory? All I need is another 8K. Help!*

Michael R. LaCoursiere
Lloydminster, Alberta

If you are not using a Low-Res (CoCo 1 and 2) graphics screen, you can do a `PCLEAR0` with `POKE25,14:POKE&HE00,0:NEW`. Also, Microcom sells *512K BASIC* and Danosoft sells *Big BASIC*, which may interest you.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

Novices Niche

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Music

Songwriter's Helper

By Bill Bernico

CoCo 3

As a songwriter I know how hard it is to come up with a tune. Sometimes they come to me without thinking, but sometimes I need a little inspiration. That's where this program comes in handy.

When I run it, I first select the fast speed so I can sit back and try to hear a usable pattern. I usually input about 30 or 40 notes when Line 9 asks how many I want to hear. Then the music plays.

There are also medium and slow speeds available to see the names of the notes on the graphics keyboard as they are played.

The listing: SONGRITR

```
0 'COPYRIGHT 1989  FALSOFT,INC
1 'SONG WRITER'S HELPER
   FOR THE COCO 3 (C)1989 FROM
   BILL BERNICO SOFTWARE
2 WIDTH32:CLS:PRINT"SELECT SPEED
 (S-M-F)     OR qUIT
3 Q$=INKEY$:IFQ$=""THEN3
4 IFQ$="S"THENPLAY"L2":GOTO9
5 IFQ$="M"THENPLAY"L10":GOTO9
6 IFQ$="F"THENPLAY"L30":GOTO9
7 IFQ$="Q"THENCLS:END
8 GOTO 2
9 INPUT"NUMBER OF NOTES";P:HSCRE
EN2:HCLS4:HCOLOR8,4:HDRAW"BM31,5
0D65R20U65NL20R15D65R20U65NL20R5
0D65R20U65NL20R15D65R20U65NL20R1
5D65R20U65NL20
10 HPAINT(33,51),8,8:HPAINT(68,5
1),8,8:HPAINT(138,51),8,8:HPAINT
(173,51),8,8:HPAINT(208,51),8,8:
HDRAW"BM5,50":FORX=1TO7:HDRAW"ND
90R35":NEXT:HDRAW"D90L245":FORNT
=1TOP:A=RND(12):ON A GOSUB11,12,
13,14,15,16,17,18,19,20,21,22:NE
XT NT:GOTO2
11 HPRINT(2,15),"C":PLAY"C":HCOL
OR4:HPRINT(2,15),"C":HCOLOR8:RET
URN
12 HCOLOR4:HPRINT(4,8),"C#":PLAY
"C#":HCOLOR8:HPRINT(4,8),"C#":RE
TURN
13 HPRINT(7,15),"D":PLAY"D":HCOL
OR4:HPRINT(7,15),"D":HCOLOR8:RET
URN
14 HCOLOR4:HPRINT(9,8),"D#":PLAY
"D#":HCOLOR8:HPRINT(9,8),"D#":RE
TURN
15 HPRINT(11,15),"E":PLAY"E":HCO
LOR4:HPRINT(11,15),"E":HCOLOR8:R
ETURN
16 HPRINT(15,15),"F":PLAY"F":HCO
LOR4:HPRINT(15,15),"F":HCOLOR8:R
ETURN
17 HCOLOR4:HPRINT(17,8),"F#":PLA
Y"F#":HCOLOR8:HPRINT(17,8),"F#":
RETURN
18 HPRINT(20,15),"G":PLAY"G":HCO
LOR4:HPRINT(20,15),"G":HCOLOR8:R
ETURN
19 HCOLOR4:HPRINT(22,8),"G#":PLA
```

```
Y"G#":HCOLOR8:HPRINT(22,8),"G#":
RETURN
20 HPRINT(24,15),"A":PLAY"A":HCO
LOR4:HPRINT(24,15),"A":HCOLOR8:R
ETURN
21 HCOLOR4:HPRINT(26,8),"A#":PLA
Y"A#":HCOLOR8:HPRINT(26,8),"A#":
RETURN
22 HPRINT(28,15),"B":PLAY"B":HCO
LOR4:HPRINT(28,15),"B":HCOLOR8:R
ETURN
```

Games

Star Defender

By Ralph M. Boughton

CoCo 3

The object of *Star Defender* is to shoot down as many enemy ships as possible before your three bases are destroyed. Use your right joystick to control the cannon in the lower part of the screen just above the three bases. Press the fire button to fire the lasers while watching the gauge at the top of the screen. When the gauge is all black, your lasers are depleted. Scoring hits in increments of five recharges the lasers. Keeping the cannon to the far right or left kills them. No easy shots are allowed. Those of you who do not have an RGB monitor need to change the RGB in lines 4 and 47 to CMP. Good Luck!

The listing: STARDEF

```
0 ' COPYRIGHT 1989  FALSOFT,INC
1 'STARDEF BY RALPH M. BOUGHTON
2 POKE65497,0:ONBRKGOTO47
3 HBUFF1,1900:HBUFF2,1200:HBUFF3
,2000
4 PALETTERGB:HCOLOR4,10:V=0
5 HSCREEN2
6 P=0:PC=0:F=0:G=0:H=0:J=0:K=0:N
=0:L=0:B=0:D=0:E=0
7 C$="C4;S6;BM164,58;L3;U5;H5;U5
;F5;R3;E5;D5;G5;D5"
8 HLINE(82,1)-(234,9),PSET,B
9 HPRINT(30,0),"LASER"
10 HDRAW"C4;S6;BM164,160;R8;U6;L
3;U5;L2;D5;L3;D6"
11 B$= "D4;R6;U4;D4;L3;D5;L6;D6;
R12;U6;L3;L4":GOSUB41
12 HPAINT(162,56),2,4:HPAINT(166
,158),3,4
13 HGET(120,28)-(202,71),1
14 HGET(128,140)-(212,164),2
15 HGET(0,0)-(78,46),3
16 HPUT(132,28)-(192,65),3,PSET:
HPUT(128,140)-(212,164),3,PSET
17  FORX=120TO-120STEP-20-RND(10
)
18 IF X<=-90 THENX=-110:FORX=-10
0TO120STEP20+RND(10)
19 IF X>=145THENX=130:GOTO17
20 HPAINT(42,188),3+F,4+G:HPAINT
(166,188),3+H,4+J:HPAINT(266,188
),3+K,4+N
21 IFHPOINT(162,174)=10-D THEN D
=3:V=V+1:GOSUB43
22 IF HPOINT(42,174)=10-B THEN B
=3:V=V+1:GOSUB42
23 IF HPOINT(262,174)=10-E THEN
E=3:V=V+1:GOSUB44
24 IF V=3 THENHCLS: HCOLOR3,10:
FORI=1TO50:SOUND10,1:PALETTE10,R
ND(64)-1:NEXT:GOTO47
25 IF P=5 THEN L=0:P=0
26 IF PC=10THEN GOTO4
27 HPUT(120-X,28)-(202-X,71),1,P
SET
28 HPUT(128-R,140)-(212-R,164),2
,PSET
29 J0=JOYSTK(0):IFJ0<30THENR=R+3
5:S=-35:ELSEIFJ0>30THENR=R-35:S=
35
30 IFR>=140THENS=-0 ELSEIFR<=-10
5THENS=0
31 IFR>=140THENR=125ELSEIFR<=-10
5THENR=-98
32 IFR<>125ANDR<>-98 THENA=BUTTO
N(0):IFA=1 THEN L=L+3:IFL<150THE
NGOSUB40ELSEIFL>150THENL=150
33 Z=20:IFL>=150 THENZ=0
34 IF RND(3)=1 THENHLINE(162-X,5
3)-(162-X,185),PSET,BF :HLINE(16
2-X,53)-(162-X,185),PRESET,BF:SO
UND5,1
35 IF HPOINT(158-X,45)=10 OR HPO
INT(162-X,45)=10 THENGOSUB45
37 HLINE(85,2)-(231-L,8),PSET,BF
:HLINE(232,2)-(232-L,8),PRESET,B
F
38 NEXTX
39 GOTO17
40 HLINE(168-R-S,143)-(170-R-S,1
2),PSET,BF:HLINE(168-R-S,143)-(1
70-R-S,12),PRESET,BF:SOUND26,1:R
ETURN
41 HDRAWC$:HDRAW"C4;BM36,168"+B$
:HDRAW"C4;BM160,168"+B$:HDRAW"C4
;BM260,168"+B$:RETURN
42 FORI=1TO10:SOUND50,1:NEXTI:L=
L+Z:F=5:G=4:HDRAW"C8;BM36,168"+B
$:HCOLOR4,10:RETURN
43 FORA=1TO10:SOUND50,1:NEXTA:L=
L+Z:H=5:J=4:HDRAW"C8;BM160,168"+
```

```
B$:HCOLOR4,10:RETURN
44 FORM=1TO10:SOUND50,1:NEXTM:L=
L+Z:K=5:N=4:HDRAW"C8;BM260,168"+
B$:HCOLOR4,10:RETURN
45 FORQ=0TO16STEP2:SOUND10*Q+20,
1:HCIRCLE(164-X,45),Q,3:NEXTQ:FO
RI=1TO500:NEXTI:HPUT(122-X,28)-(
200-X,71),3,PSET:O=RND(2):IFO=1T
HENX=-90ELSEX=120
46 PC=PC+1:P=P+1:SC=SC+1:HPRINT(
1,0),"SCORE":HCOLOR10,10:HPRINT(
5,0),SC-1:HCOLOR4,10:HPRINT(5,0)
,SC:RETURN
47 RGB:HCOLOR3,10:HPRINT(13,13),
"SCORE":HCOLOR3,10:HPRINT(19,13)
,SC:HPRINT(10,15),"AGAIN (Y/N)<E
NTER>?":LINEINPUTA$:IFA$="Y"THEN
SC=0:P=0:V=0:HCOLOR4,10:RGB:GOTO
4ELSEPOKE65496,0:END
```

Mind Master

By Kevin Speight

CoCo 3

Mind Master is a short program modeled on the game *Mastermind*. It selects a code for you to break consisting of four digits, each of which can be any number from one to six. You must make guesses about the computer's code until you get it right or run out of guesses. After each guess the computer gives your score. The first digit in the score is the number of digits you have guessed correctly and which fall in the right place. The second digit is the number of digits you have guessed that are in the computer's code but are in the wrong place. By looking at your previous scores and guesses, you can figure out the computer's code. To make the game harder, you can change the maximum number of guesses in Line 40 or the length of code numbers the computer can choose in Line 30. (You should be able to break the code in about six guesses if you're good.)

The listing: MINDMSTR

```
0 ' COPYRIGHT 1989  FALSOFT,INC
10 'mindmaster-BY KEVIN SPEIGHT
20 X=RND(-TIMER)
30 CLS3:PRINT@170,"MIND-MASTER";
:FORX=1TO1000:NEXT:CLS3:X$="":FO
RX=1TO4:RA=RND(6):X$=X$+MID$(STR
$(RA),2,1):NEXTX:A$=X$:B$=CHR$(1
75)
40 FORWQ=1TO13    '# OF GUESSES
50 X$=A$:W=(WQ-1)*32:PRINT@W+1,"
GUESS #"WQ;:PRINT@W+11,B$;:PRINT
@W+14,"";:INPUTGU$:PRINT@W+21,B$
;:PRINT@W+31,B$;:Q$=GU$:SOUND50,
1:IFLEN(Q$)<>4 THEN50
60 FOR EP=1TO4:T=VAL(MID$(Q$,EP,
1)):IFT>6 OR T<1 THENSOUND1,1:GO
TO50 ELSENEXT EP
70 FORXX=1TO4:FORYY=1TO4:IFMID$(
GU$,XX,1)=MID$(X$,XX,1) THENP=P+
1:MID$(GU$,XX,1)="0":MID$(X$,XX,
1)="9":NEXTYY:NEXTXX ELSENEXTYY:
NEXTXX
80 FORXX=1TO4:FORYY=1TO4:IFMID$(
GU$,XX,1)=MID$(X$,YY,1)THEN R=R+
1:MID$(GU$,XX,1)="0":MID$(X$,YY,
1)="9":NEXTYY:NEXTXX ELSENEXTYY:
NEXTXX
90 PRINT@W+22,"SC:";P;R;:SOUND15
0,1:IFP=4 THENPRINT@454,"YOU WON
!!";:FORX=100TO150:SOUNDX,1:NEXT
X:GOTO110 ELSE P=0:R=0:NEXTWQ
100 PRINT@448,"TOO MANY GUESSES,
 YOU LOSE.....":PRINT@483," MY N
UMBER: "A$;:SOUND100,1:SOUND1,1
110 INPUT"   ENTER";EN$:RUN
```

Home Help

Shopper Ease

By James S. McNeill

16K ECB

Have you often found, when shopping in the grocery's dairy section with a jumbled list, that you overlooked an item when you were in produce, or vice versa? *Grocery List* should put a bit of organization into your tour(s) and save on shoe repairs. Edit Line 20 for your desired baud rate. The printout affords you two shopping lists per page; select your number of pages at the prompt. When inserting your paper, align the top edge with the printer ribbon. Being thrifty, I print on both sides of the paper to reap four lists. If you do, be sure at each paper insertion that the right and left paper edges are positioned consistently. Warning: If you use the "two sides" list, be sure to delete everything from this week's list; otherwise you may go back next week, reorder from the wrong side, and find yourself in big trouble when you get home!

The listing: GROLIST

```
0 ' COPYRIGHT 1989  FALSOFT,INC
5 CLS8:PRINT@137," GROCERY LIST
";:PRINT@206," BY ";:PRINT@263,"
 JAMES S. MCNEILL ";:PRINT@327,"
 WILMINGTON, DEL.";:PRINT@397,"
1989 ";
10 FOR Y=1 TO 3000:NEXT Y
15 CLS:PRINT@132,"THERE WILL BE
```

```
TWO GROCERY":PRINT@196,"LISTS PE
R PRINTED PAGE.":PRINT@260,"PRIN
T HOW MANY PAGES";:INPUTA
20 POKE 150,87 '600 BAUD
25 FOR K=1 TO A
30 PRINT#-2,TAB(14)"GROCERY LIST
                              GRO
CERY LIST"
35 PRINT#-2,STRING$(39,42)"  "ST
RING$(39,42)
40 PRINT#-2:
45 PRINT#-2,TAB(3)"Bakery Produc
ts        Fruits              Bake
ry Products        Fruits"
50 PRINT#-2,TAB(3)STRING$(15,45)
"        "STRING$(6,45)"
    "STRING$(15,45)"        "STR
ING$(6,45)
55 PRINT#-2,STRING$(9,10)
60 PRINT#-2,TAB(3)"Cereals
        Vegetables          Cere
als              Vegetables"
65 PRINT#-2,TAB(3)STRING$(7,45)"
              "STRING$(10,45)"
        "STRING$(7,45)"
     "STRING$(10,45)
70 PRINT#-2,STRING$(9,10)
75 PRINT#-2,TAB(3)"Cleaning Prod
ucts       Meats             Clea
ning Products       Meats"
80 PRINT#-2,TAB(3)STRING$(17,45)
"       "STRING$(5,45)"
   "STRING$(17,45)"       "STRIN
G$(5,45)
85 PRINT#-2,STRING$(9,10)
90 PRINT#-2,TAB(3)"Dairy Product
s       Paper Products      Dair
y Products       Paper Products"
95 PRINT#-2,TAB(3)STRING$(14,45)
"       "STRING$(14,45)"      "S
TRING$(14,45)"       "STRING$(14
,45)
100 PRINT#-2,STRING$(9,10)
105 PRINT#-2,TAB(3)"Frozen Foods
         Miscellaneous       Fro
zen Foods         Miscellaneous"
110 PRINT#-2,TAB(3)STRING$(12,45
)"         "STRING$(13,45)"
  "STRING$(12,45)"         "STRI
NG$(13,45)
115 PRINT#-2,STRING$(12,10)
120 NEXT K
125 END
```

Graphics

Kaleidoscope

By John Mosley

CoCo 3

Kaleidoscopes are fun to watch, and you can make one on your CoCo 3. Just type in this listing and run it. The computer displays a multicolor symmetric pattern. To clear the screen without stopping the program, press the CLEAR key. To stop the program, press BREAK.

The listing: SCOPE

```
0 ' COPYRIGHT 1989  FALSOFT,INC
5 CLS:INPUT"MONITOR (C)OMPOSITE
OR (R)GB";A$
10 IF A$="R" OR A$="r" THEN M=1
ELSE M=0
15 DIMC(32):FORT=1 TO 32:READC(T
):NEXTT
20 FORT=0 TO 15:PALETTET,C(M*16+
T+1):NEXTT
25 HSCREEN2:HCLS15
30 POKE65497,0
35 C=RND(15):X=RND(24)-1:Y=RND(2
4)-1
40 GOSUB125:V=INT(RND(9)):IF V=3
 THEN C=INT(RND(24))-1
45 IF C>15 THEN C=15
50 D=INT(RND(8))
55 I$=INKEY$:IF I$=CHR$(12) THEN
 HCLS15
60 IF D=1 THEN Y=Y-1
65 IF D=2 THEN X=X+1:Y=Y-1
70 IF D=3 THEN X=X+1
75 IF D=4 THEN X=X+1:Y=Y+1
80 IF D=5 THEN Y=Y+1
85 IF D=6 THEN X=X-1:Y=Y+1
90 IF D=7 THEN X=X-1
95 IF D=8 THEN X=X-1:Y=Y-1
100 IF X<0 THEN X=0
105 IF Y<0 THEN Y=0
110 IF X>23 THEN X=23
115 IF Y>23 THEN Y=23
120 GOTO 40
125 A=X*4:B=Y*4:HCOLORC:HLINE(15
7-A,93-B)-(159-A,95-B),PSET,BF
130 HLINE(157-B,93-A)-(159-B,95-
A),PSET,BF
135 HLINE(161+A,93-B)-(163+A,95-
B),PSET,BF
```

```
140 HLINE(161+B,93-A)-(163+B,95-
A),PSET,BF
145 HLINE(157-A,97+B)-(159-A,99+
B),PSET,BF
150 HLINE(157-B,97+A)-(159-B,99+
A),PSET,BF
155 HLINE(161+A,97+B)-(163+A,99+
B),PSET,BF
160 HLINE(161+B,97+A)-(163+B,99+
A),PSET,BF
165 RETURN
170 DATA 63,55,7,52,17,33,60,41,
26,32,42,11,28,6,38,0,63,60,36,5
4,16,18,26,61,57,56,59,11,25,32,
52,0
```

Education

The Change Counter

By Darren Day

16K ECB

Whether saving for a CoCo or your next subscription to THE RAINBOW, every penny counts. This program makes the task of counting change easier. Just type in the listing, save it, and type RUN. If you don't want to add to the base amount, press ENTER. Then start counting. For every quarter Press Q; every dime, D; every nickel, N; and every penny, P. After you finish counting, press 6. Then you'll be given the option to create a hardcopy or end the program.

One of the most useful statements in the program is PRINT USING. It's great for formatting numerical information into a pleasing format. I highly recommend you look it up in Tandy's *Extended Color BASIC* manual. And keep saving!

The listing: CHANGE

```
0 ' COPYRIGHT 1989  FALSOFT,INC
5 'THE CHANGE COUNTER
  WRITTEN JUNE 1988-DARREN DAY
10 CLS
20 PRINT "WHAT DO YOU WANT TO AD
D TO THE":INPUT " TOTAL";M
30 CLS
40 PRINT "THE CHANGE COUNTER"
50 A$=INKEY$
60 IF A$="Q" THEN M=M+.25:Q=Q+1:
SOUND 210,1
70 IF A$="N" THEN M=M+.05:N=N+1:
SOUND 216,1
80 IF A$="D" THEN M=M+.10:D=D+1:
SOUND 218,1
90 IF A$="P" THEN M=M+.01:P=P+1:
SOUND 223,1
100 IF A$="6" THEN GOSUB 140
110 PRINT @32,"TOTAL=";:PRINT US
ING "$**###.##";M
120 PRINT "QUARTERS:";Q:PRINT "D
IMES:";D:PRINT "NICKELS:";N:PRIN
T "PENNIES:";P
130 GOTO 50
140 PRINT "ARE YOU ABSOLUTELY SU
RE?(Y/N)"
150 A$=INKEY$
160 IF A$="N" THEN CLS:PRINT "TH
E CHANGE COUNTER":RETURN
170 IF A$<>"Y" THEN 150
180 PRINT "ALL RIGHT,PRESS <H> F
OR HARDCOPY OR <Q> TO QUIT."
190 A$=INKEY$
200 IF A$="H" THEN GOSUB 220
210 IF A$<>"Q" THEN 190 ELSE END
220 PRINT #-2,"The Change Counte
r"
230 PRINT #-2,"Total=";:PRINT #-
2,USING "$**###.##";M
240 PRINT #-2,"Quarters:";Q:PRIN
T #-2,"Dimes:";D:PRINT #-2,"Nick
els:";N:PRINT #-2,"Pennies:";P
250 RETURN
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one screen sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs whould be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

GAME POINT SOFTWARE

This Month's Feature

NEW For CoCo 3

Z'89

by Steve Bjork

A hostile space fortress has been spotted at the outer edge of our galaxy. Destroy this menacing battle platform by navigating your spacecraft with the utmost skill to scale walls; dodge force fields; blow up fuel tanks; dog fight defense ships; evade comets and ultimately disable the powerful robot overlord!

Six years after this arcade hit was first released on the Color Computer 1, world renown software author Steve Bjork brings one of his most popular and most requested games to the Color Computer 3 market.

Z'89 puts your flying skills to the ultimate test in this 100% M/L game featuring 5 Mega-Bytes of Super-Res Graphics and Digital sound! At last, a program that actually out shines the original arcade version!!! Requires a Color Computer 3 128K disk system.

REG. $29.95 Introductory Special $24.95!

DONUT DILEMMA

NEW For CoCo 1, 2

by Nickolas Marentes

Angry Angelo has raided Antonio's Donut Factory sending the entire complex amuck! Donuts have come alive and are jumping around in wild frenzies. Machines have gone out of control throwing cooking fat, dough and icing sugar everywhere! You must help poor Antonio climb ladders, Jump platforms and ride elevators to reach the top floor and shut down the factory's power generator which will restore law and order.

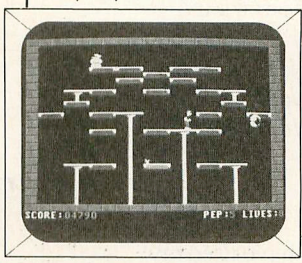
Disk. . .$19.95

Rupert Rythym

by Nickolas Marentes

Help Rupert infiltrate "Music Box Records" and collect all of his stolen notes which are scattered throughout the complex. Ride the crazy elevators and beware of the security robots on patrol.

This strategy arcade game features 17 different, 16 color graphic screens and some of the hottest digitized percussion music and vocals you've ever heard. Disk or Tape. . .$24.95



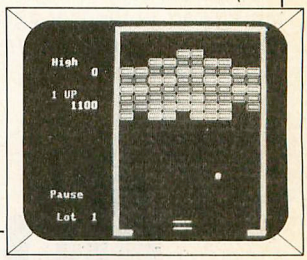
NEW For CoCo 1, 2, 3

bash

by Steve Bjork

Based on a popular arcade game which we can't mention (But sounds like "Art Gannoyed"). BASH challenges you to clear the screen by "BASHING" your ball through multiple brick layers. Of course you'll have help getting through this 20 level game by activating options like, Slow Ball, Expanded Paddle, Multi-Ball, and more!

$24.95

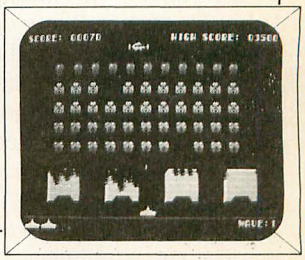


SPACE INTRUDERS

by Nickolas Marentes

Enemy alien creatures have been identified entering our solar system, their destination: our home planet! Their goal: the total annihilation of our race. They must not be allowed to land!

An action arcade game featuring high quality 16 color graphics and sound effects. $24.95

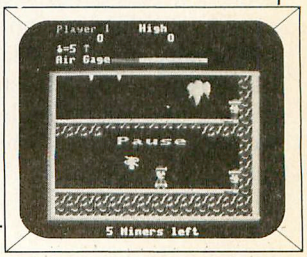


MINE RESCUE

by Steve Bjork

A terrible mine disaster has just occured and it will be up to you and your talents to enter the mine, jump the pits, avoid the spikes, fight off the bats and other creepy crawlers and get air to the needy victims. Mine rescue features over 2 megabytes of arcade-style graphics, real time music and multiple mine levels. Hours of fun!

$24.95



warp fighter 3-D

by Steve Bjork

$24.95 (Extra Glasses $2.95)

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If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

The war against drug abuse

CoCo Teaches Kids to "Just SayNo"

By Fred B. Scerbo
Rainbow Contributing Editor

Over the past nine years I have used my CoCo for a multitude of tasks. Most of them are educational in nature, but occasionally I come up with a game or utility to help in our wrestling tournaments.

In recent weeks, however, I have given my trusty CoCo an even greater task — taking part in the war against drug abuse. This month's program, *Just Say No*, is the product of that effort.

Drug abuse is a widely publicized problem with students these days. I have tried several approaches in dealing with the problem. The best approach, however, seems to be reaching kids at a young age.

This is why Nancy Reagan's "Just Say No" campaign is so successful. We have been able to convince a large segment of youngsters of the danger of drug abuse. But the problem continues.

In recent months, our quiet little city of North Adams, Massachusetts (pop. 12,000), was rocked by a drug-related controversy. It seems that NORML (National Organization for the Reform of Marijuana Laws) decided to pick our little community as the site of a day-long pro-pot rally.

Our city spent the final month fighting this group's efforts to stage what would amount to a mini-Woodstock. Mind you, we were not trying to block the group's right to free speech on the issue but were trying to keep its efforts restricted to a rally — not a day-long rock concert on our baseball fields.

The event was finally held on May 28, 1989, but the expected 3000-odd spectators never showed. Instead, fewer than 150 marijuana advocates arrived at what the area newspapers called "a bust." Still, there were a number of us who needed to express our disagreement with the concept of legalizing marijuana smoking and sales. So we held a counter-rally of our own. And what good is a rally or protest without signs and buttons?

A Handy Little Device

Several years ago I purchased the starter kit of a product called Badge A Minit. It costs around $30. With it you get a small hand press, the dies needed to press your buttons, and enough blank button pieces to make 10 professional-looking buttons. Spare button parts can be obtained in bulk quantities for as little as 19 cents each.

Over the years I have used our Badge A Minit to make thousands of buttons. (I later even invested in a more expensive model.) I have made buttons out of photographs, magazine pictures and comic books. However, the most fun is designing your own.

Here's where the CoCo comes in. Using a good screen dump program and a graphics program such as *CoCo Max*, I have been able to come up with some clever-looking buttons.

I find the best buttons to use with younger students are hollow-letter sayings colored in with markers or colored pencils. Still, I realize many people do not own an expensive graphics program, but many do own printers and screen dump programs.

With all this in mind, I decided to create *Just Say No*, a BASIC program that draws out four variations of a Just Say No button.

Using the Program

The program is designed to work with any screen dump program. The button's size is designed to work with a screen dump that does not stretch the graphics of one screen to fill a whole 8½-by-11-inch sheet of paper.

If your screen dump makes an elongated picture, you can still use the pictures to make buttons by cutting a circle to fit the actual size of the button. Some buttons have a black background; others have a blank background that can be colored in. In either case, youngsters or adults can get as fancy as they want.

But wait! What if you don't own a Badge A Minit or similar button maker? You can still mount these paper buttons on cardboard with a safety pin on the back and obtain colorful results.

Where Do I Get It?

If you are interested in getting your own starter set, a rather nice tool to have if you have a CoCo and graphics program, you can order one toll-free at 1-800-223-4103. You can also write for a catalog c/o Badge A Minit, 348 North 30th Road, Box 800, LaSalle, IL 61301.

Conclusion

You can have some fun and make an impact on young people with *Just Say No*. With suggestions and a little prompting from you, I might even be able to come up with some practical program or game dealing with drug abuse (an adventure game, maybe?).

You may also want to drop me a line if you know of some other use for this program with another product other than Badge A Minit. (Maybe someone could use the design to embroider a patch or something along those lines.)

You be the judge. In the meantime keep those ideas and requests coming in. ❑

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

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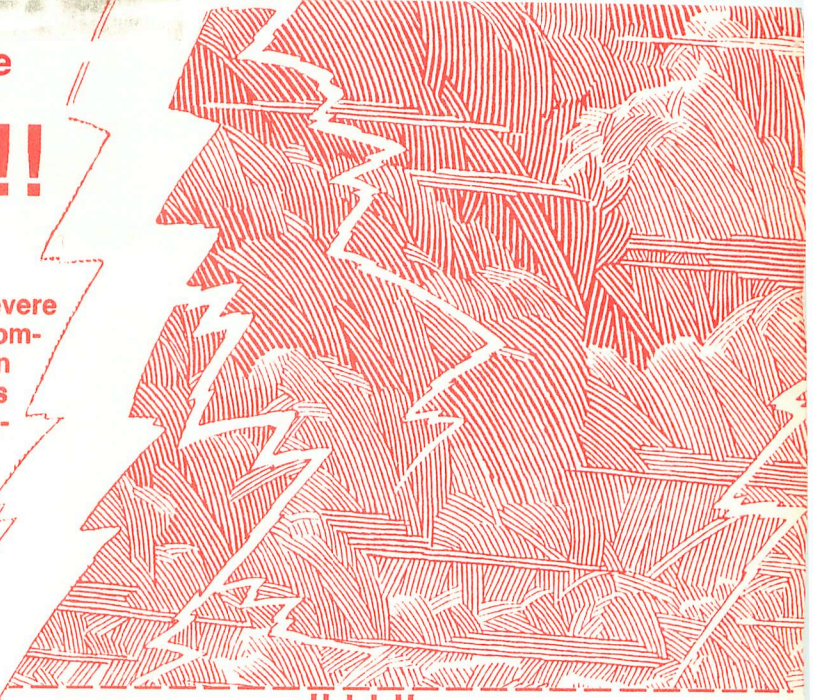

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1 REM*************************
2 REM*  JUST SAY NO TO DRUGS  *
3 REM*  BUTTON & BADGE MAKER  *
4 REM*    BY FRED B. SCERBO   *
5 REM*    60 HARDING AVENUE   *
6 REM* NORTH ADAMS, MA 01247  *
7 REM*   COPYRIGHT (C) 1989   *
8 REM*************************
10 CLS0:PRINTSTRING$(32,188);STR
ING$(32,204);
15 FORI=1TO160:READ A:PRINTCHR$(
A+128);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,179);
25 DATA112,125,120,122,117,117,1
24,125,117,124,126,125,80,94,92,
90,94,92,90,90,,90,21,18,,16,16,
26,30,28,28,29
30 DATA,117,,122,117,117,,,,,122
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6,,26,26,,,21
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DRUGS ";
60 PRINT@356," BUTTON AND BADGE
MAKER ";
65 PRINT@388,"    BY FRED B.SCER
BO    ";
70 PRINT@420,"   COPYRIGHT (C) 1
989   ";
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A$(3)="BU13BL32NU2R4U6NL2R2BR2D6
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95 IFX$="1"THEN100ELSEIFX$="2"TH
EN155ELSEIFX$="3"THEN195ELSEIFX$
="4"THEN240ELSE90
100 PMODE4,1:PCLS1:SCREEN1,1
105 CIRCLE(58,72),58,0,.9
```


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```
110 CIRCLE(196,72),58,0,.9
115 PAINT(58,24),0,0
120 PAINT(196,24),0,0
125 DRAW"BM22,98C1"+A$(1):DRAWA$
(2):DRAWA$(3)
130 PAINT(24,90),1,1:PAINT(64,90
),1,1:PAINT(30,60),1,1:PAINT(50,
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),1,1:PAINT(30,60),1,1:PAINT(50,
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155 PMODE4,1:PCLS1:SCREEN1,1
160 CIRCLE(58,72),58,0,.9
165 CIRCLE(196,72),58,0,.9
170 DRAW"BM22,98C0"+A$(1):DRAWA$
(2):DRAWA$(3)
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190,60),0,0:PAINT(216,60),0,0
190 IFINKEY$=CHR$(13)THEN320ELSE
190
195 PMODE4,1:PCLS1:SCREEN1,1
200 CIRCLE(58,72),58,0,.9
205 CIRCLE(196,72),58,0,.9
210 PAINT(58,24),0,0
215 PAINT(196,24),0,0
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(2):DRAWA$(3)
225 PAINT(24,90),0,0:PAINT(64,90
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60),2,0:PAINT(76,60),0,0
230 DRAW"BM161,98C1"+A$(1):DRAWA
$(2):DRAWA$(3)
235 IFINKEY$=CHR$(13)THEN320ELSE
235
240 PMODE4,1:PCLS1:SCREEN1,1
245 CIRCLE(58,72),58,0,.9
250 CIRCLE(196,72),58,0,.9
255 DRAW"BM22,98C0"+A$(1):DRAWA$
(2):DRAWA$(3)
260 PAINT(24,90),0,0:PAINT(64,90
),0,0:PAINT(30,60),0,0:PAINT(50,
60),2,0:PAINT(76,60),0,0
265 FORI=4TO58STEP8:CIRCLE(58,72
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190,60),0,0:PAINT(216,60),0,0
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285 DRAW"BM22,98C1"+A$(1):DRAWA$
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290 DRAW"BM161,98C1"+A$(1):DRAWA
$(2)
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),1,1:PAINT(30,60),1,1:PAINT(50,
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305 DRAW"BM22,98C0"+A$(1):DRAWA$
(2)
310 DRAW"BM161,98C0"+A$(1):DRAWA
$(2)
315 IFINKEY$=""THEN315
320 CLS:PRINT@224,"  PREPARE TO
LOAD SCREEN DUMP.":PRINT:PRINT
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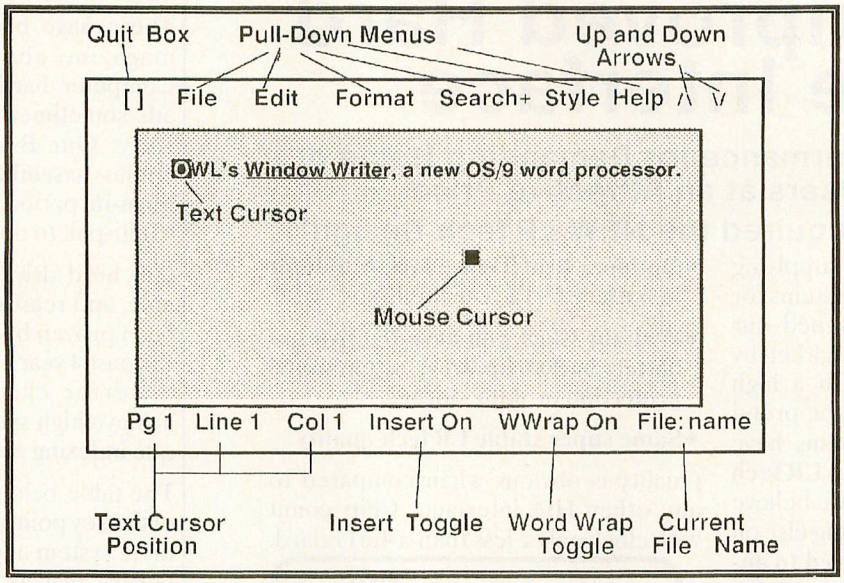
Quit Box
Pull-Down Menus
Up and Down Arrows
[] File Edit Format Search+ Style Help
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Text Cursor
Mouse Cursor
Pg 1 Line 1 Col 1 Insert On WWrap On File: name
Text Cursor Position
Insert Toggle
Word Wrap Toggle
Current File Name

Pull Down Menus and Help Screens

A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one menu item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse (or joystick) or can be accessed by control keys.

Hi-Res Display

Window Writer uses an **80-column monitor display** screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

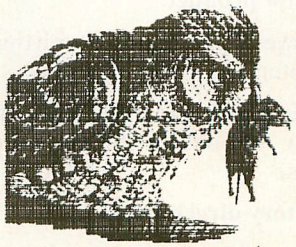
Ram Disk

A RAM disk is set up in **Window Writer** to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. **Window Writer's** clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

Mail-Merge

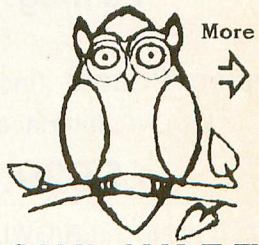
With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.



OWL's Efficient Mouse Useage (Makes editing a snap!)

Editing

Like most modern word processors, with **Window Writer** there is always more than one way to access any editing feature. You can access editing by menus using mouse, "keyboard mouse", or through control keys. Full help screens are quickly available for all editing features. A help screen can be left visible while needed and then quickly removed to get back to full screen editing.



One nice feature is the price:

only $59.

For the DynaSpell Spelling Checker by Dale Puckett:

only $20. additional!

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NEW! Improved Hard Drive Interface

Same Proven Performance for Demanding Home or Business Users at an Attractive Price

OWL-WARE has Acquired the NEW LRTech Design!

OWL-WARE has now been supplying Color Computer hard drive systems for about 4 years. We have reached our position in the hard drive market by providing our customers with a high quality product that they can be proud to own and use. These systems have been designed around the LRTech Hard Drive Interface which we believe is superior in quality to anything else on the market. **We are now pleased to announce that we have acquired the full rights to a new, improved version of this well-know product!**

There are several new features with this improved interface. These include:

- **Full SASI/SCSI compatible (this allows many add-ons to the versatile SCSI buss)**
- **Lower factory-direct prices**
- **Fast Delivery from factory stock**
- **Additional SCSI options next month!**
- **Optional Real Time Clock with built in battery (3-10 year lifetime)**
- **With the Clock you have 240 Bytes of battery backed up RAM for password protection or data storage!**
- **Same super stable LRTech quality**

Quality is obvious when compared to any other HD interface. Chip count with clock only 2 less than a 4in1 board.

Interface Price only: $85.

Real Time Clock-RAM: $25.

SASI controller is unused surplus. Add $100 for SCSI

20 Meg. 40 Meg. 80 Meg.
(2X40 Meg.)

System Prices: (Includes Hard Drive, case, & fan, SASI Controller, LR/OWL Interface, Software. Fully assembled and tested.)

$529. $629. $939.

Kit Prices: (LR/OWL System as above but not assembled or tested.)

$499. $599. $ 899.

Hard Drives (Drives only /with controller for B&B)

(20 Meg) $229/279 (RLL 30) $269/$329 (40) $319/$369

OWL Hard Drive BASIC 3

There have been several ads in this magazine about BASIC for Color Computer hard drive systems. These ads sometimes only tell a part of the story. Our BASIC system price includes **assembly, testing,** and **3-day burn-in** period. We do not require a Multi-pak to operate.

Our hard drive systems are fast, reliable, and reasonable in price. This has been proven by hundreds of users over the past 4 years. We do not have to turn off error checking for speed. We achieve high speed BASIC from a unique indexing method.

The table below will summarize some of the key points about our BASIC hard drive system and the B&B system. We believe that we have the best BASIC interface for CoCo hard drives available.

BASIC Hard Drive Systems*

Feature	OWL	B&B
Drive Portion Available at One Time	Entire	Partial (4 sections)
User Sets BASIC/OS-9 Partitions	YES	Yes
Add to Existing OS-9 Drive Without Reformat	YES	No(?)
Drives 0-3 Hard/Floppy	YES	No
Built in Park	YES	No
Speed*	FAST	Fast

*All feature details are believed to be true at time of writing and are subject to change. We believe that our BASIC hard drives are the fastest due to our indexing method, but both systems are fast. On ours all BASIC commands work including DSKINI, DSKI$, and DSKO$.

Prices: With/Without Hard Drive

$35./$79.

Technology

the Color Computer Frontier

DISK DRIVES

Floppy Drive Systems

The Highest Quality for Years of Service

(We have located a number of unused, surplus single sided drives for those who wish a quality, inexpensive system.)

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$199.** (Same but Single sided) **$185**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$129.** (Same but Single sided) **$115.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$179.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (Drives 0,1,2,3) $295.

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model 500 $119. **Model 501 or 502 $129.**

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 5 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

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Technical Help
1-215-837-1917

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

OWL DOS

An operating system that gives faster disk access and allows the use of double-sided drives. Corrects a floating point number error on early CoCo systems.

COPY-IT

Quickly copies selected programs between disks. A wild card option selects groups of programs to copy.

VERIFY

Verifies reading of each sector. Bad sectors are listed on the screen.

2 GAMES

We will select 2 games from our stock. These sold for more than $20 each.

If sold separately this is more than $125 worth of software!!

Do not mistake this software with cheap, non-professional "Public Domain" software which is being offered by others. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

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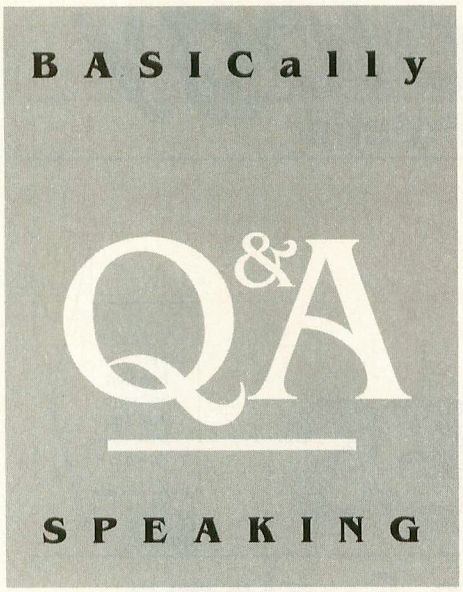
Mertztown, PA 19539



By Larry Boeldt

Dear Larry:

Thanks very much for preparing the BASIC program Convert *(May 1989, "BASICally Speaking," Page 98). However, there is an SN (Syntax) Error in Line 70. Could you please correct this?*

Jesse Foster

Dear Jesse:

The listing in THE RAINBOW generates the error you pointed out. Line 70 in the magazine reads:

```
70 INPUT"ENTER THE PROGRAM NAME;
"F$
```

It should read:

```
70 INPUT"ENTER THE PROGRAM NAME"
;F$
```

Notice the semicolon is between the ending quote and F$. Remember to save the program you want to convert in ASCII format. For example, let's say the program you want to save is called WINNER.BAS. Simply load the WINNER.BAS program into memory and type SAVE"WINNER.BAS",A.

Now load up *Convert* and run it. When it asks for a filename, type WINNER.BAS. The program executes, and all the PRINT lines in WINNER.BAS are converted to PRINT #-2 lines.

Line 60 is also listed incorrectly. As listed it looks like this:

```
60 '65 CLEAR 14000:DIM L$(500)
```

Lines 60 and 65 should be separate like this:

```
60 '
65 CLEAR 14000:DIM L$(500)
```

Now that we have cleared up the bugs, have fun using *Convert*. Thank you for bringing this error to my attention.

Dear Larry:

I am using Fred Scerbo's Title Screen Maker *program ("Wishing Well," March 1986, Page 157) to generate screens for my own program. His program (once screens are generated) uses a single BASIC line to read data statements that create the individual screen. The BASIC line reads:*

```
10 CLS0:FOR I=1 TO 480 READ A:PR
INT CHR$(A+128);:NEXT I
```

My generator program uses this line followed by data statements to create a screen. Then to save the graphic screen to disk, a SAVEM"SCREEN",1024,1535,1024 *is used—hence my problem. All screens can be seen while they are generated. Is there any way to generate the screen "invisibly" and save it to disk? This way the screen will be a surprise when it is first run.*

Jerry Crabtree
Huntington, West Virginia

Dear Jerry:

The solution to your problem is quite simple. Type the two lines below into the listing you gave me. Of course this does not save the screen, but it is generated out of sight and pops on when the generation is complete. All you need to do is change all the CoCo 3's palette registers to 0 and then execute the RGB command to reset the colors.

```
99 FOR X=0 TO 15:PALETTE X,0:NEX
T X
101 RGB
```

Dear Larry:

I have a CoCo 3, CM-8 monitor and an FD-501 disk drive. I am having a problem with the HPUT *command. I took my CoCo 3 to the dealer three times for repair. The people there told me CoCo 3s work that way and they could not fix it. They said some programs in the CoCo 3 manual and in RAINBOW do not work on the CoCo 3.*

The following program illustrates the problem. It works the same on all HSCREENs. *What is wrong with my computer?*

```
10 HBUFF 1,43
20 HSCREEN 4
30 HLINE(10,0)-(20,10),PSET,B
40 HGET(10,0)-(20,10),1
50 HPUT(26,20)-(36,30),1,PSET ' W
ORKS
60 HPUT(28,40)-(38,50),1,PSET ' G
ARBAGE
70 HPUT(400,120)-(410,130),1,PSET
 ' GARBAGE
80 HPUT(540,120)-(550,130),1,PSET
 ' GARBAGE
90 HPUT(570,120)-(580,130),1,PSET
 ' WORKS
99 END
```

I have a problem with PUT *as well.*

Carl Fraser
Kingston, Ontario

Dear Carl:

After reading your letter, I came to the stark realization that our CoCos have a bug. When I bought my CoCo 3 (I had the first one available at my store), I took it home and dug right into the Hi-Res graphics. To my disappointment, the same type of problem occurred.

I would like to call out now for a response. I urge anyone with a fix for this problem to speak up and write a letter to THE RAINBOW. Your help will be appreciated by the whole CoCo Community.

Questions about specific BASIC programming problems can be addressed to BASICally Speaking, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we recieve, we are unable to anserw letters individually.

Questions can also be sent to Larry through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow magazine Services, then , at the RAINBOW> prompt , type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt , where you can select the "BASICally Speaking" online from which has complete instructions.

Larry Boeldt has programmed on the Color Computer for five years. He has experience with BASIC, Pascal and FORTRAN IV. He runs a software customizing business for the CoCo market.

Chicago, April 14-16, 1989

RAINBOWFEST REPORTER

Reporter: Jeffrey S. Parker Editor/Photographer: Cray Augsburg

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An Animated CoCo Crowd

Thousands of loyal Color Computer enthusiasts flocked to the 17th semiannual RAINBOWfest to see the new introductions to the Color Computer lineup and to take advantage of fantastic bargains. CoCo 3s were selling for $100 by Sunday afternoon, a record-breaking price hundreds of people took advantage of. Other bargains included CM-8 RGB monitors for $165; tilt-and-swivel monitor platforms for 75 cents; and hardware and software from Radio Shack and other vendors.

Showgoers traveled from all over the country and Canada to the most exciting RAINBOWfest yet. Door prizes included three specially-made CoCo Cats, software packages, hardware prizes and a MIDI synthesizer from Rulaford Research.

Lonnie Falk, founder and publisher of THE RAINBOW, expressed delight at the response from the crowd to the vibrant displays of music and graphics that dominated the packed exhibition halls. He indicated that this RAINBOWfest was one of the most heavily attended of all the shows, attributing its success to the terrific support for the Color Computer and the enthusiasm of people who read THE RAINBOW.

Spirits were high and the air was buzzing as many new vendors made their debut, including DanoSoft and its powerful *Big BASIC* program, Oblique Triad and Ken-Ton Electronics. ❑

Rick Adams addressed a full room at the Community Breakfast.

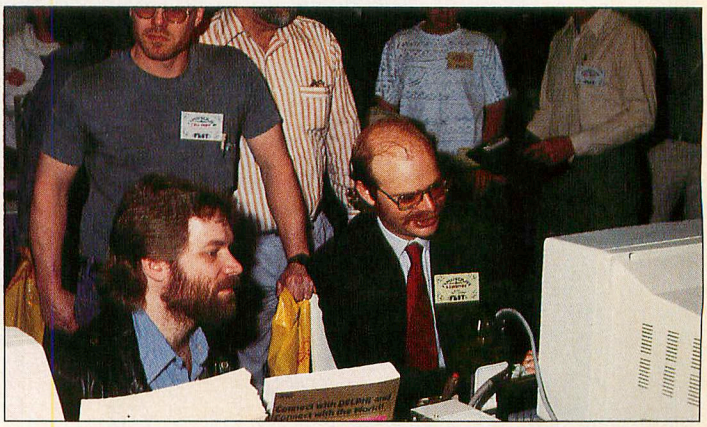
Rick Adams Entertains at CoCo Community Breakfast

Rick Adams, currently known best for his *DelphiTerm* and *GameTerm* programs, as well as *RickeyTerm* and the infamous *Doubleback* game from Tandy, just to mention a few, was the keynote speaker for the Chicago RAINBOWfest. Adams gave 'festers a rollicking tour through the lighter side of computer programming and revealed how some of his most famous programs came to be. His stories of an overheated CoCo 1 on which he used to program with a cassette deck and which he had to cool off with a can of freon (it still crashed) had people laughing so hard, they had a tough time eating the delicious eggs in puff pastry being served.

Lonnie Falk, publisher of RAINBOW, gave a strong and lasting message of support to the CoCo Community. Lonnie concluded the Community breakfast stating, "As long as there is a Color Computer out there, there will be RAINBOW Magazine out there to support it." ❑

Delphi Hosts Saturday Nite Howler

Saturday night after the exhibit hall closed and seminars were over, Delphi members and their guests were invited to meet, relax and match faces with user names. (Although no one actually saw CoCo Yono and the Telecommunicats, we know they were there in full swing.) With tired people gratefully reclining in chairs, many Delphi members got a chance to meet RAINBOW writers and match up unknown faces with people previously identified by username only. A good time was had by all well into the night. ❑

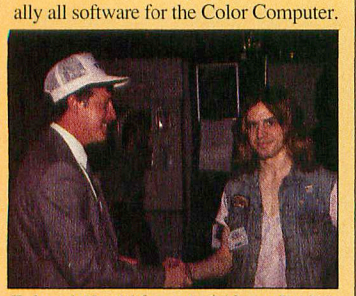


RAINBOW Contributing Editor Marty Goodman explains the ins and outs of the CoCo Sig on Delphi.

Prizes Galore!

Orion Offers Free Multi-Pak

Ken Gideon, of Schaumburg, Illinois, was the happy winner of the Tandy Multi-Pak Interface given away by Orion Technology. Orion Technology is the manufacturer of *Telepak II*. This Deluxe RS-232 device, selling at $49.95, features gold connectors, a three-foot cable, needs no Multi-Pak Interface, and is compatible with virtually all software for the Color Computer.



Telepak II sold for only $40 as a RAINBOWfest special, along with all the other show specials offered by Orion. ❑

[THE RAINBOW wants to thank the exhibitors for displaying their outstanding and innovative products at RAINBOWfest and for their generosity in donating these fabulous prizes.]

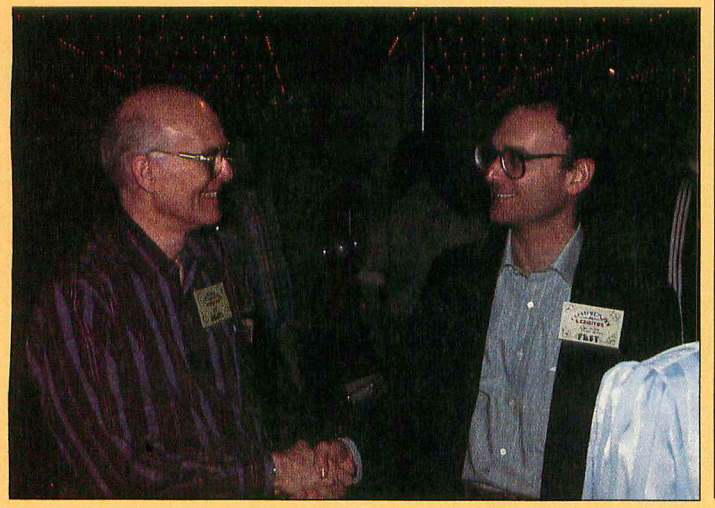
Rulaford Research Raffles a $275 Yamaha Keyboard

Max Meise, a teacher from Warren Central High School in Indianapolis, won the fabulous $275 Yamaha PSS-480 keyboard with MIDI Interface (Musical Instrument Digital Interface). Max was unavailable for comment or photo, but we are sure that wherever he is, he and his students are making music with *CoCo MIDI 3* from Rulaford Research.

Rulaford Research, owned and operated by the renowned Cecil Houk, is the last word on CoCo and MIDI combinations. The company entertained all the showgoers with a seemingly endless stream of professionally arranged musical masterpieces produced with a variety of programs, including *Lyra*, *Musica II* and *CoCo MIDI 3*. There were terrific show specials in addition to all the wit and wisdom of Cecil himself, who conducted the ongoing performance with showmanship and flair. ❑

$100 Gift Certificate Given by Zebra Systems

Mr. Allen Parker, of Grissom Air Force Base, was the lucky winner of the Zebra Systems $100 gift certificate. The certificate was good for any product sold by Zebra Systems, including the *CoCo Graphics Designer Plus* banner, greeting card and sign-making program. Allen was not sure which goodies to take back to Grissom AFB: Would it be Zebra's striking new *Z-Write*, or the Z-SPI serial-to-parallel printer interface, or ROM Emulator package? When I last saw him, he was deep in contemplation at the Zebra booth! ❑



Three Lucky Winners Take CoCo Cat Home

Among the many prizes given away at RAINBOWfest Chicago, the CoCo Cats in particular stood out. There were three of these bright yellow and white furry creatures. Winners were selected at random by a drawing from those who bought souvenir RAINBOWfest photo buttons. A winner was selected for each day of the 'fest.

One of CoCo Cat's first fans, seven-year-old Shannon Fisher (above) of Indianapolis, is shown here, grinning with his newly-won CoCo Cat. Shannon enjoys CoCo Cat in THE RAINBOW every month and likes to play games such as *Downland* and *Dragonfire* on the CoCo. He decided to put CoCo Cat in a "place of honor" in his room at home near the computer.

I never dreamed I'd win so imagine my surprise when I was named the lucky winner in the Saturday drawing!

Amy Novack, a 12-year-old from McHenry, Illinois, was the third lucky winner of the CoCo Cat on Sunday. Amy reads THE RAINBOW every month. Her favorite columns are "RAINBOW Scoreboard" and "RAINBOW Hints." She enjoys playing games on the CoCo and using educational software and says CoCo Cat will stay in her room on her bed. ❑

Alpha Gives Away Entire Software Library

Mr. Andre J. Lavelle, of Torrence, California, was the winner of the Alpha Software Technologies software library that consists of one of each product made by Alpha. This array of software includes *Warp One* windowing terminal, *Disk Manager Tree*, *Presto Partner*, *The Zapper*, *Multi-Menu* and *OS-9 BBS*, all designed to run under OS-9 Level II. With this arsenal of high-performance software, Mr. Lavelle will be an ace programmer before too long. Utility tools are also included so if Mr. Lavelle has not been an OS-9 user, he certainly will become one now. ❑

Seminars Educate, Enlighten, Entertain

RAINBOWfest played host to a series of seminars hailed by listeners as the most innovative, exciting and illuminating ever held at the conventions. At the Hyatt-Regency Woodfield, thousands of people filled the meeting rooms. Most of the seminars on Saturday and Sunday played to standing-room-only audiences, some members of whom spilled out into the hallways.

For those who were unable to attend the convention, here is a summary of the seminars:

• **OS-9 for Absolute Beginners with Cray Augsburg**: This seminar was an introduction to the OS-9 Operating System for absolute novices. Cray Augsburg, RAINBOW Technical Editor, explained some of the fundamentals of the OS-9 operating system.

• **BASICally Speaking with Bill Bernico**: Bill is a frequent contributor to THE RAINBOW and has written more than 200 Color Computer programs. This rigorous seminar was for those having programming problems, which Bill helped fix on the spot.

• **Steve and Monique Bjork Discuss Writing Game Software**: Steve Bjork hardly needs an introduction, having written more than 20 games for Tandy and the Color Computer. This seminar gave insight into how such games as *Zaxxon*, *Sands of Egypt* and *Super Pitfall* were created. Monique Bjork, a graphics artist, discussed her contributions to *Super Pitfall*, and both Bjorks handled numerous questions in this standing-room-only seminar.

• **Chris Burke of Burke and Burke Discusses Hard Drives**: This was a full-to-overflowing seminar with Chris discussing many of the important things you should know when considering the purchase of a hard drive for a CoCo. The seminar was very technical in nature, discussing the differences between disks and controllers and focusing on speed and performance. Chris brought samples to the seminar to explain the differences in controllers and drives and fielded quite a few questions.

• **Kevin Darling and Paul Ward Host Overview of OS-9**: This seminar addressed all levels of programmers and users in a question-and-answer format that ran for over an hour past its scheduled stopping time. The enthusiasm was such that when Kevin and company left the room, the crowd followed them. Among those in attendance were programmers from Microware.

• **Art Flexser Introduces Extended ADOS-3**: Art is the owner of Spectro Systems and author of the ADOS series of enhanced BASIC language interpreters for the Color Computer and CoCo 3. Extended ADOS-3 is a product that goes hand-in-hand with ADOS-3, just as BASIC goes hand-in-hand with Disk Extended Color BASIC.

• **CoCo Consultations Live With Marty Goodman**: Marty hosted a session of CoCo Consultations live with guest speakers that included Don Hutchinson of Delphi and Rick Adams, author of *RickeyTerm* and *DelphiTerm*.

• **Dr. Goodman and Surprise Guests Discuss the Color Computer**: This lively and informative session went past its scheduled time as people lined the walls for a chance to get their questions answered by Marty and the other CoCo Community celebrities.

• **Ed Hathaway on Computer Clubs**: President of the Glenside Color Computer Club, the official hosts of RAINBOWfest Chicago '89, and president of Second City Software, Ed gave hands-on information on what it takes to make a Color Computer Club fly in your own community.

• **Houk and MIDI**: Cecil Houk of Rulaford Research talked on Color Computers, music and MIDI. Between demonstrations on a CoCo/MIDI rig, Cecil did an entertaining job of explaining how MIDI works with the CoCo 3 and what you can do to become a successful professional with a MIDI.

• **Jutta Kapfhammer**: The Managing Editor of RAINBOW distributed information about submissions and writing for publication, discussing ideas individually with those interested.

• **Bill Nee and Assembly Language**: This discussion of assembly language programming revolved around using the Radio Shack *Disk EDTASM+* editor assembler.

• **Dale Puckett's Overview of BASIC-09**: In a standing-room-only crowd of eager programmers and programmers-to-be, Puckett, spoke at length on the wonders of this "highly-structured, unstructured programming language."

He covered programming basics and focused on the power of BASIC09 compared with other BASIC language interpreters.

• **Gary Robinson Discusses the Tandy Product Evaluation Process**: Sporting a CoCo tee-shirt and cowboy boots, the tall, silver-haired representative of Tandy Corporation explained what Tandy looks for when software is submitted. He gave an overview of the testing and evaluation procedures and the differences between Express Order Software and Tandy "line" products.

• **Dick White and CoCo Spreadsheets**: Co-author of the *TIMS* database management program, White presented an overview of spreadsheets for the CoCo and how they can be used in homes, small businesses and organizations financial planning.

• **Sister Berdelle Weise on Color Computers and the Teacher**: Sister Berdelle spoke at length on why she has chosen the Color Computer for her students. She explained the many ways she has been able to integrate the Color Computer into curriculums. ❑

HD Products Fare Well

Joe Scinta, owner of Ken-Ton Electronics, explains the advantages of a true SCSI hard drive interface.

Ken-Ton Electronics was displaying its true SCSI interface, driving two hard drives at blazing speed at the same time. This show-stopper system was so fast with disk accesses that the drive could run two lists at once and still have time for more. The high-quality controller boards Ken-Ton makes are manufactured to military specifications, meaning they are tough and should last a long time with their heavy-duty components. The hard drive interface can use a Multi-Pak or a Y-cable and is compatible with most DOSs being offered for CoCo hard disks, a notable example of which is the RGB DOS (HD) from RGB Computer Systems. Also on display was the Ken-Ton dual communications board, featuring either one or two complete RS-232 ports. Jumper-selectable for up to four ports, this high-quality product is an alternative to the RS-232 Pak from Radio Shack. This could be a very important product for multiuser OS-9 systems.

RGB Computer Systems demonstrated its RGB DOS (HD) package for the CoCo to the amazement of many showgoers. This DOS works with or without a hard drive — in fact, it can control two hard drives simultaneously. Because it can handle drives of any size, it gave some real competition to Burke and Burke products. At $29.95 this is an extremely affordable DOS. RGB DOS (HD) offers such enhancements as an improved `COPY` command, a `RUNM` command for machine language programs and much more. ❑

A Look at Some Attendees

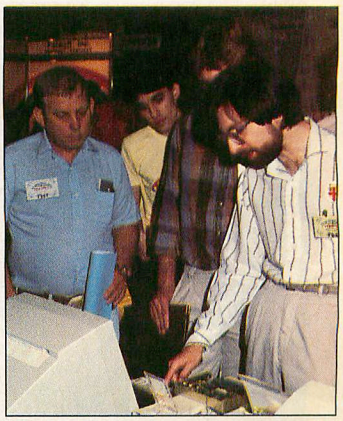
This RAINBOWfest Report brings you something new and interesting. As well as discussing the celebrities and exhibitors, the seminars and door prizes, RAINBOW wants you to meet the people who come to a RAINBOWfest — some from unusual walks of life and faraway places.

Jerry Cook of Marion, Indiana, a professional with the Boy Scouts of America, uses his CoCo at work for flyers, letters and brochures. He thought the show was much better than last year's RAINBOWfest but didn't like waiting in line to buy his ticket!

Dina Phillips of Indianapolis, a retired radio and TV copy writer, uses the CoCo for spreadsheets, labels and databases. Dina has actually written a database system.

Bob Santy of Medford, Massachusetts, attended to hear the seminars on OS-9. Bob uses the CoCo at home for software development, then ports (moves) his software from the CoCo to a UNIX computer at work.

James Jones, a software engineer from Microware (makers of OS-9), came to the convention to meet people who use CoCos and OS-9, to buy some software, and to attend the seminars on OS-9. ❑



Chris Burke shows off some OS-9 magic. Burke and Burke introduced "Quarter Meg," a 256K upgrade for the CoCo 3.

New Introductions Made at the 'Fest

The latest RAINBOWfest turned out to be the greatest for new introductions. The CoCo 3, available for nearly two years now, is gaining tremendous support, which is reflected by the many new products developed for it. Here is a sampling of introductions made at the convention:

• Arizona Small Computer Peripherals hosted a number of items for sale, including its Eagle keyboards and adapters. These allow you to use a PC style keyboard on a CoCo.

• Cer-Comp Ltd, owned and operated by Bill Vergona, introduced its latest version of *Window Master*, a point-and-click operating environment for Disk BASIC. Bill managed to program his own windowing system (not to be confused with OS-9) that truly does wonders for the CoCo.

• Game Point Software made one of the most startling introductions at RAINBOWfest with the Rascan Video Digitizer, which takes full advantage of all the CoCo 3 capabilities by actually capturing and displaying super high-resolution, 4096-pixel graphics images in full color (requires 512K). Images can be edited with most popular CoCo 3 graphics editing programs. Priced at $159.95, the software features joystick or mouse control and pop-up windows. Gamepoint also introduced Bjork's *Donut Dilemma* and *Bash* for the CoCo 1, 2 and 3.

• Gimmesoft introduced its new *V-TERM Terminal Emulator* Version 3.02 that emulates VT-52 and VT-100 terminals to allow communications with VAX, UNIX, mainframe computers and BBSs.

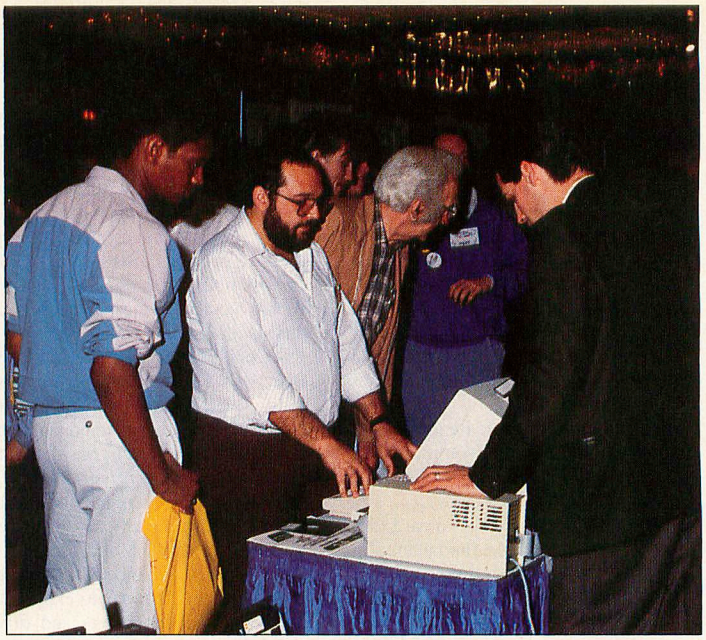
• Oblique Triad, a new exhibitor, entertained showgoers with its *Seventh Link* three-dimensional, three-disk graphics adventure. Partners of Oblique Triad, Jeff Noyle and Dave Triggerson, also introduced *Caladuril II*, a different sort of graphics adventure, and *Studio Works*, a powerful digital audio recorder/editor system that edits two complete samples at once with two separate clipboards.

• Owl-Ware maintained its state-of-the-art reputation with the introduction of *Window Writer*, a mouse-driven, pull-down menu, window-oriented word processor for the CoCo 3 that uses OS-9 Level II. Owl-Ware also introduced its new SASI/SCSI hard drive interface, which has an optional battery-backed 10-year real-time clock and 240 bytes of battery-protected RAM.

• The Public Domain Software Copying Company surprised showgoers with six new CoCo disks from Australian users groups. These are high-quality programs for entertainment, productivity and utility. They are of special interest to American CoCo users because of some of the idioms and expressions native to Australians, yet foreign to Americans — "G'day, mates!"

• Second City Software introduced its all-new *Ultimuse III* music player/recorder/editor system for CoCo 3 under OS-9. This is the only product of its type for the Color Computer, using the power of OS-9 and a MIDI keyboard to produce professional results. Also newly introduced was *NewsArt A thru Z*, for the *Newspaper Plus* desktop publishing system and other desktop publishing software consisting of 26 clip art disks.

Jeff Noyle and Dave Triggerson brought Oblique Triad all the way from Canada for its first 'fest.



Contributing Editor Tony DiStefano, also owner of CRC/Disto, tickles the CoCo ivories. His 4-in-1 board , which includes a hard drive interface, received a great deal of interest at the show.

• SpectroSystems introduced the amazing new *Extended ADOS-3* by Art Flexser for the Color Computer 3 with *ADOS-3*. This is a powerful replacement for Extended Color Disk BASIC, is EPROMable, and adds powerful commands and features such as a RAM disk in ROM.

• Sundog Systems, owned and operated by Glen R. Dahlgren, featured its new arcade-style smash hit, *Warrior King* for CoCo 3, along with other new features such as *Quest for the Star Lord* and *PALADIN*, introduced officially at RAINBOWfest.

• Zebra Systems dazzled showgoers with its brand-new Turbo-Port advanced joystick, its *Z-Write* word processor, the *Wild Card ROM Emulator* and the Z-SPI serial-to-parallel interface for printers.

• C-Bug, Inc., a new exhibitor at RAINBOWfest Chicago, featured one of the largest selections of printer ribbons in the area, with over a hundred different types of ribbons. Also offered at huge discount were disk wallets for both 3½- and 5¼-inch disks in a rainbow of fashion colors. Binders, disk storage boxes, paper supplies, surge suppressors and toolkits were all on display.

• StG Computers, of Speedway, Indiana, longtime supplier of quality OS-9 software, was exhibiting its very popular *Supercomm 2.0*. Dave Phillipson, author of *Supercomm 2.0* for OS-9 Level II, was on hand to show off the features of his high-end communications software and to meet users and answer questions. This load-and-run program was a knockout at the 'fest with its pop-up windows. Also on display was StG's *Login* BBS system for OS-9 Level II, a full-featured system for multiusers.

• T & D Subscription Software displayed a fantastic assortment of software in home management, education, adventures, business helpers, games, utilities, electronics and machine language. Special packages of some of T & D's best were available for special show bargain rates. Along with the 630 current titles, T & D also featured 81 issues of its software on tape and disk, totaling well in excess of 810 high-quality programs. Along with its CoCo software selections, T & D also displayed PC-compatible and Tandy 1000 software at the 'fest.

• Howard Medical Computers of Chicago, long famous in the CoCo Community for its high-quality monitors, printers, disk drives and innovative accessories, had terrific specials on its Magnavox 8CM515 color monitors. Other specials included Howard/Burke hard-drive systems, coupon specials, and a scratch-and-dent table where plucky showgoers collected some real bargains. The full line of Star printers, including the NX-1000 for just $185, was displayed as well. Of special interest to Tandy 1000 fans was the internal hard drive for the 1000 EX, the only one of its kind made.

There was a plethora of important new products for the Color Computer, showing just how much fast-growing support there is out there right now for the CoCo. ❑

It's Time for a Sale SALE!!

It's Fall, and what better time than this to have a sale? We're celebrating our upcoming 14th birthday! 14 years, in business!, WOW, that's longer than any other CoCo company! So lets have a sale to end all sales. In the July issue, The RAINBOW wrote some good things about our products. We decided to put them on sale. Call for unlisted sales and other new products.

Here is what RAINBOW said about Sculptor:
"Sculptor: The most powerful software system made for OS-9." ,"it is extremely easy to use as a programming language, and you will be able to write programs in about one-tenth of the time you could write the same thing in C" , " If you want to pick a language to learn, Sculptor is it."

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53,280 William Currie, Bryans Road, MD

VARLOC *(Radio Shack)*
2,502 Frank D'Amato, Brooklyn, NY
2,032 Tony Harbin, Cullman, AL
2,032 Edward Rocha, Cobleskill, NY

VICIOUS VIC *(THE RAINBOW, 7/86)*
18,813 Talib Khan, Bronx, NY
15,063 John Conley, Everett, WA

WARRIOR KING *(Sundog Systems)*
31,800 Jason Cotting, Jackson, MS
18,700 Jason Bauer, Menominee, MI

WILDWEST *(Tom Mix)*
52 Farrell Kenimer, Phoenix, AZ
35 Paul Summers, Orange Park, FL

WISHBRINGER *(Infocom)*
400/201 Brad Wilson, Lithia Springs, GA

WIZARD'S DEN *(Tom Mix)*
593,950 Richard Winkelbauer, Bronx, NY
467,000 David Reash, Hadley, PA
425,350 Leif Smedberg, Columbia City, IN
195,050 Mark Touchette, Preston, CT

WRESTLE MANIAC *(Diecom)*
956,971 Marc Reiter, Cincinnati, OH
546,315 Louis Bouchard, Gatineau, Quebec

XENION *(Diecom)*
429,530 Chris Deierlein, Peekskill, NY
159,190 Charles Rene de Catret, St-Laurent, Quebec

ZAKSUND *(Elite Software)*
557,900 Tom Cherubino, Brooklyn, NY
357,550 Martin Parada, Arcadia, CA
268,350 Tony Bacon, Mt. Vernon, IN

ZAXXON *(Datasoft)*
2,061,000 Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA

ZONERUNNER *(Radio Shack)*
65,535 Scott Godfrey, Nashua, NH
65,535 Mike Woycheshen, Coquitlam, British Columbia

ZONX *(THE RAINBOW, 8/85)*
13,000 Joel Klein, Indianapolis,IN

ZORK *(Infocom)*
350/328 Konnie Grant, Toledo, OH
350/587 Matthew Yarrows, Easthampton, MA

Give us your best: Join the ranks of these courageous CoCoists in showing the Color Computer world your high score at your favorite micro-diversion. We want to put your best effort on record in THE RAINBOW's bimonthly "Scoreboard" column. All entries must be received 60 days prior to publication. Entries should be printed — legibly — and must include your *full* name, address, game title, company name and, of course, your high score. Each individual is limited to three score entries per month. Send your entries to Scoreboard, c/o THE RAINBOW.

For greater convenience, your high scores may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG>prompt, pick MAIL, then type SEND and address to: EDITORS.

★★★★★★★ SCOREBOARD POINTERS ★★★★★★★

In conjuction with THE RAINBOW's Scoreboard, we offer this bi-monthly column of pointers for game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

In response to questions from:

• Darrel Hoffman: In *Dallas Quest*, in order to bribe the parrot into helping you, examine it, then type TICKLE ANACONDA'S CHIN to bribe him.

David Hohenstein
Nashville, Arkansas

• Matthew Smith: In *In Quest for the Starlord*, at the lake type WET BLANKET. To get past the machinery type THROW BOTTLE. Be very careful here; death comes fast and swift. Then type NORTH.

• Greg Dorsha: In *Sea Quest*, to use the air tanks type FILL TANKS. To fill tanks you need the credit card.

In *Lansford Mansion*, how do I get past the guard?

Tony Durst
Brantford, Ontario

• Scott Brady: To kill the spider in *Dallas Quest*, you need to have the eggs from the vulture.

• Greg Dorsha: To get past the mirror in *Black Sanctum*, you have to GET ROPE, then WEAR ROPE.

In *Shennanigans* how do I get across the ravine in the cave? Also, in *Trekboer* how do I get past the grate in the ravine?

Charles Heck
Mt Vernon, Illinois

• Rommel Bruehl: The ring and $100 bill are good bribes in *The Interbank Incident*. The high-level gold card has no money in its account. Read the postcard and look for a person with the same initials. When in doubt, identify objects, read, talk, bribe and write to THE RAINBOW.

Does anybody know what to do with the medicine, the IBC shirt, or the writer of the postcard? I need detailed instructions on how to operate the museum and portable computers. Also, which guy do I give the dice to? Nobody wants them.

Clinton Morell
Sacramento, California

• Derek Wood: The flasks in *Dungeons of Daggorath* give you superpowers. The Hale flask gives you mental powers and keeps you free of disease. The Thews flask gives you muscular powers. Last but certainly not least, the Abye flask causes your heartbeat to speed up, which causes a heart attack. Also, the Hale flask slows your heartbeat down to a slow pace.

In *Dungeons of Daggorath*, there is a ring to be found on every level: in the first level the fire ring, the second the ice ring, but in the third I don't know. I've killed every creature in the third level except the wizard's image. Does the image carry a ring, seer scroll or elvish sword? When I kill him, do I hit then run or hit then run repeatedly? How do I get to the fourth level?

Jason Hanna
Galveston, Texas

• Peter Menning: In *Madness and the Minotaur*, to get the shield you must have a very low physical condition or have certain objects. The only time you use JUMP is to jump over the pits. In the room with the pool type LOOK POOL and it tells you certain objects you need to obtain.

In *Dungeons of Daggorath*, on the second level how do I kill the bat, which sounds like the Galdrog? How do I kill the wizard with only a bronze shield and an iron sword?

Brad Renfro
Owensboro, Kentucky

• William C. Millington: In *A Mazing World of Malcom Mortar*, when you have been through all three mazes in one level and have collected the gold bricks, you must use the three gold bricks to get through the levels. You eventually build up the magic bricks and trap Malcom Mortar. The gold bricks SAVE through the levels of the game.

Jason Brewer
Buhl, Alabama

Scoreboard:

In *Thexder*, where is the exit out of Level 5? Whenever I get to Level 5, I work my way through some of it. But after I come to a creature that gives Thexder energy and enmax points, I can't get much further. I can see a passage that may lead to an exit, but I can't get to it. There are no entrances or shootable walls. What do I do?

Steven Lipstraw
Dallas

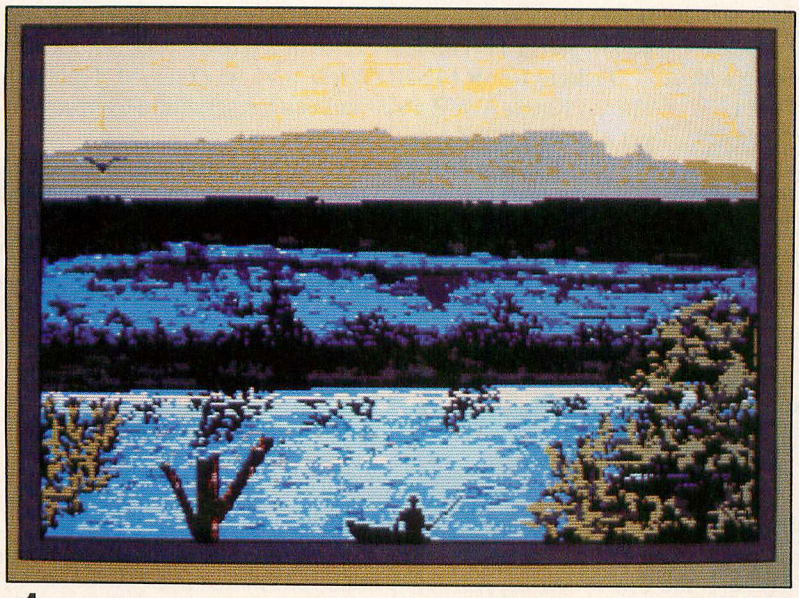
Scoreboard:

I just love the series *Hall of Kings*. I have finished both levels I and II. I have been working on the third one for a while but can't figure out what to do with the rope. I thought I might tie it to the crowbar, but the crowbar keeps slipping out of reach. Also, how do you get out of the room that has no exits — the one with the pool.

Kevin Gattis
Wilson, North Carolina

To respond toothers readers' inquiries and requests for assistance, reply to "Scoreboard Pointers" c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will share your reply with all "Scoreboard" readers in an upcoming issdue. For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL, section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type SEND and address to:EDITORS. Be sure to include your complete name and address.

CoCo Gallery



1st Place

Fishing
Joel R. O'Rear

Enjoy a relaxing day of fishing in the great outdoors. Joel, of Tucumcari, New Mexico, created this scene with *CoCo Max III*.

SHOWCASE YOUR BEST!

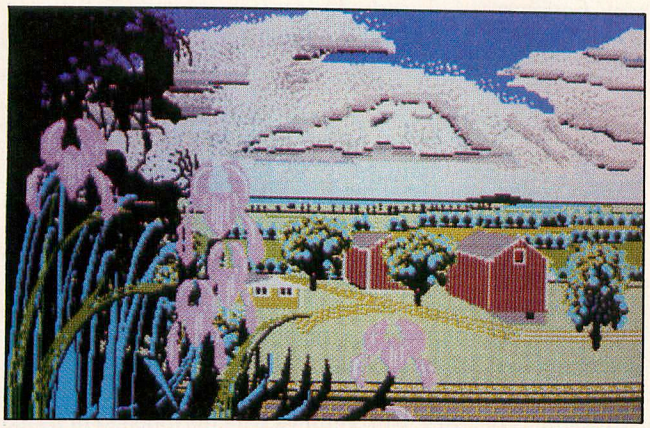
You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will forward one first prize of $25, one second prize of $15 and one third prize of $10.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

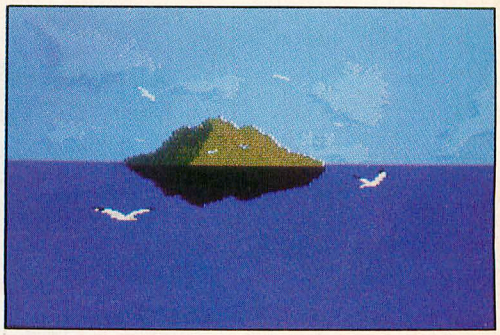
—Tony Olive, Curator



2nd Place

Dubuque
John Murvine, Jr.

Here's a *CoCo Max III* file showing a view of a farm near Dubuque, Iowa, with irises in the foreground. John lives in Ebensburg, Pennsylvania.



3rd Place

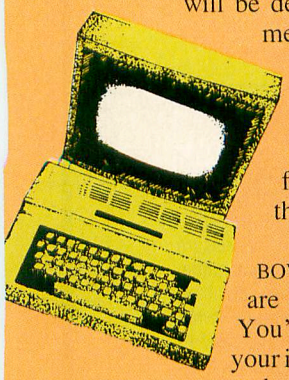
Ocean
Pierre Morris

Imagine having your own private island for a summer getaway. From Beauport, Quebec, Pierre generated this picture with a program he designed.

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products** for **the first time. Somerset, New Jersey is the show** to get information on capabilities for the CoCo, along with a terrific selection of the latest CoCo software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.



Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo—from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW—as well as those who are written about—are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

As an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

If you missed the fun at our last RAINBOWfest in Chicago, why don't you make plans now to join us in Somerset? For members of the family who don't share your affinity for CoCo, there are many other attractions in the Somerset area.

The Somerset Hilton — Somerset, New Jersey, offers special rates for RAINBOWfest. **The show opens Friday evening** with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — The CoCo Community Breakfast (separate ticket required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 3 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get a special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

FREE SEMINARS

Cray Augsburg
RAINBOW Technical Editor
OS-9 for Absolute Beginners

Steve Bjork
SRB Software
Game Programming and Insider Hints

Kevin Darling
Independent Programmer
Advanced OS-9

Peter Ellison
Game Point Software
Imaging Through the CoCo

Marty Goodman
RAINBOW Contributing Editor
2 CoCo Consultations Live

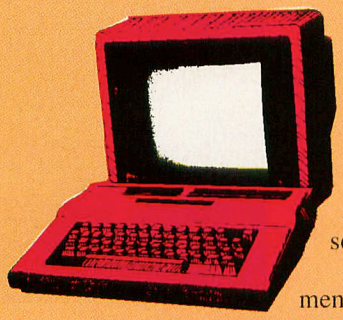
Don Hutchison
RAINBOW CoCo SIG Staff Engineer
Inside Delphi

Belinda Kirby
RAINBOW Advertising Representative
Writing for Publication

Mike Knudson
Author of UltiMusE
Music and Other OS-9 Applications

Jeffrey Parker
Independent Programmer & Author
Desktop Publishing

COCO COMMUNITY BREAKFAST



Dale Puckett - RAINBOW Contributing Editor

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP.

Mr. Puckett will talk about the people involved in the ongoing development of OS-9 and milestones in OS-9: Crazy things which happened in its development, mistakes, highlights and its future.

Plus raffle items will be given away each day of the show, including three large, stuffed, handmade CoCo Cats.

Don't forget ...

If yours is one of the first 500 ticket orders, a coupon for a complimentary issue of The RAINBOW Third Book of Adventures will be enclosed with your tickets — if yours is one of the first five orders received from your state, a coupon for a complimentary RAINBOWfest T-shirt will be enclosed with your tickets. So hurry up and place your order to take advantage of this offer.

RAINBOWfest - Somerset, New Jersey
Dates - October 20-22, 1989
Hotel - The Somerset Hilton
Rooms - Single, $65 per night
Double, $75 per night

Advanced Ticket Deadline: October 6, 1989

Join us at a future RAINBOWfest!

RAINBOWfest - Chicago, Illinois
Dates - April 6-8, 1990
Hotel - Hyatt Regency Woodfield
Rooms - $69 per night, Single or Double

FREE T-Shirt to first five ticket orders received from each state!

YES, I'm coming to **Somerset!** I want to save by buying tickets now at the special advance sale price. Breakfast tickets require advance reservations.

_____ Three-day ticket(s) at $9 each total_____
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Circle one: Friday-Saturday-Sunday
_____ Saturday CoCo Breakfast
at $12 each total _____
_____ RAINBOWfest T-shirt(s)
at $6 each total _____
Specify size:
_____S _____M _____L _____XL
(T-shirts must be picked up at the door)
Handling Charge $1 $1.00
TOTAL ENCLOSED _____
(U.S. Currency Only, Please)
❑ Also send me a hotel reservation card for The Somerset Hilton ($65, single or $75 double room).

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(please print)
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Telephone _____ ZIP _____
Company _____
❑ Payment Enclosed
❑ VISA ❑ MasterCard ❑ American Express
Account Number _____
Exp. Date _____
Signature _____

Advance ticket deadline: October 6, 1989. Orders received less than two weeks prior to show opening will be held for you at the door. Tickets will also be available at the door at a slightly higher price. Tickets will be mailed six weeks prior to show. Children 4 and under, free; over 4, full price.

Make checks payable to: THE RAINBOW. Mail to: RAINBOWfest, The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059. To make reservations by phone, in Kentucky call (502) 228-4492, or outside Kentucky call (800) 847-0309.

"Nice to meet you," says the CoCo to the child. . .

CoCo Starts Early

By Linda Falge

Kinderfun is a six-part program that helps preschoolers and early elementary students become familiar with colors, letters, numbers and music. Older children and adults will also find it entertaining.

Nice to Meet You greets the child by saying hello and asking his or her name, then flashes the name at random locations on the screen, accompanied by random sounds. It then asks the child's age, and the number scoots across the screen from left to right — again with sound. The computer then responds, "Nice to meet you." It is especially useful to parents who are teaching children how to spell their names and recognize numbers.

Colors at Random is quite simple and can be mastered by very young children who are just becoming familiar with colors. Numbers (1 through 8) are used to display the colors they represent at random locations across the screen. If the screen becomes full, the child can erase it by pressing E.

Counting Up selects a sequence of four numbers between six and 95, then asks the user to fill in the fifth number. If answered correctly, the reward is a multicolored bar accompanied by sound. If an answer is wrong five times in a row, the computer provides the correct number and moves to the next sequence. When five in a row are answered correctly, a colorful display congratulates the user. This section is especially useful to children who are learning to count to 100.

Letters-Letters uses the `INKEY$` command to display any character pressed. The character is printed in a column from top to bottom, accompanied by a delightful sound. When the screen is full, continue by pressing any key. The screen clears and the next character pressed is displayed in the first column. This helps students become familiar with letters and spelling.

Drawing Board uses the `SET` command and arrow keys. Some young children find it difficult to manipulate CoCo joysticks; the arrows, though slower, provide better control and less frustration. Pressing C changes the color of the line, and pressing E erases the screen for a new drawing.

Music to Your Ears is entertaining and educational for children with musical interest. Numbers (1 through 8) represent the C scale on a piano keyboard. When a number is pressed, the letter name of the note is displayed in the upper-left corner and the note is played. `CLS` is used with each number, assigning a particular color to each note.

Each section of *Kinderfun* is a program in itself and can be typed in and run individually if lines allowing you to return to the menu are removed. `GOTO` is used throughout for simplicity, which aids the beginning programmer in learning how the computer works. Commands such as `CLS`, `PRINT`, `PRINT@`, `SET` and `INKEY$` are also frequent since the entire program runs in the text mode.

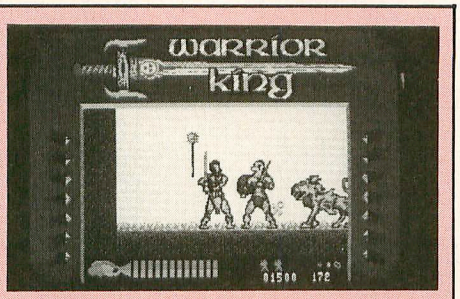
Kinderfun is designed as an entertaining and educational aid for beginning programmers as well as young children and is meant to be enjoyed by all.

(Questions or comments concerning this program may be addressed to the author at Route 1, Box 704A, Astoria, OR 97103. Please enclose an SASE when requesting a reply.) ❑

Linda Falge is a sign painter and student in basic electronics. She enjoys cars and animals and still considers herself a beginning programmer. She owns a 64K CoCo 2.

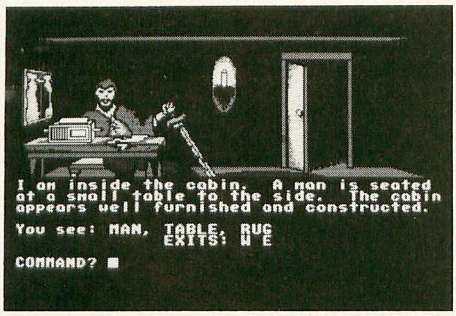
SUNDOG SYSTEMS

Warrior King



Become RASTANN, Warrior King, on the quest to regain his rightful crown, hidden deep within a sinister land. Battle monsters, gain magic and weapons, and travel through harsh wilderness and dark castle dungeons in this medieval realm. From the creator of *Kung-Fu Dude* comes this awesome arcade game for the CoCo III! *Warrior King* uses the most detailed 320x200 16 color graphics and high speed machine code to vault you into a world of fantasy. Dare ye challenge the many perils ahead in order to become WARRIOR KING? Req. 128K CoCo III, disk drive, and joystick. Only $29.95.

In Quest of the Star★Lord


I am inside the cabin. A man is seated at a small table to the side. The cabin appears well furnished and constructed.
You see: MAN, TABLE, RUG
EXITS: W E
COMMAND?

This is THE graphic adventure for the CoCo III! Unparalleled 320x200 animated graphics will leave you gasping for more! You quest for the Phoenix Crossbow in this post-holocaust world of science and fantasy. *In Quest of the Star Lord* is a full 4 disk sides of mind-numbing adventure! Req. 128K CoCo III and disk drive. Only $34.95. Hint Sheet: $3.95.

"A dynamite program! The best graphics I've seen to date on the CoCo III. You have to see it to believe it."

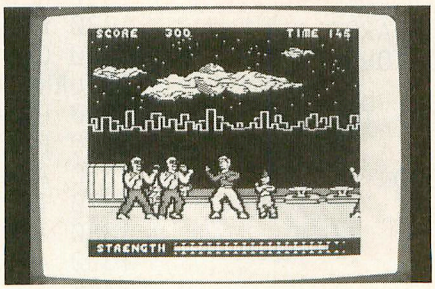
— 8/88 Rainbow review

Kung-Fu Dude

An exciting arcade game. The BEST karate game ever created for the CoCo! Destroy opponents and evade obstacles as you grow ever closer to your ultimate objective. Spectacular graphics, sound effects, and animation! Req. 64K CoCo, disk drive, and joystick. Only $24.95.

"The CoCo karate gap has been filled and Kung-Fu Dude *does it excellently. I highly recommend it!"*

— 2/88 Rainbow review



All programs CoCo 1, 2, 3 compatible, unless otherwise stated

HALL of the KING TRILOGY

The epic adventure is back! The largest adventure campaign ever seen for the CoCo is again available! A total of six disks of intense graphic adventure will have you playing for weeks! Each section is a two-disk stand alone adventure, but all three together form an epic saga. Quest for the legendary Earthstone in the ancient dwelling of the dwarves while you enjoy the classic graphics that made this trilogy famous! Each adventure can be purchased separately for $29.95, the lowest price ever, or you can purchase the entire set for only $74.95! Req. 64K CoCo and disk drive.

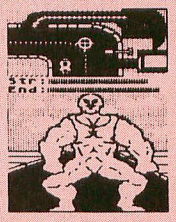
"One of the best adventures I have experienced to date!" *— 6/86 Rainbow review*

"The animated graphics are dramatic, detailed, and excellent!" *—11/87 Rainbow review*

"The adventure of a lifetime. Don't miss out!"

— 7/88 Gamer's Connection review

CHAMPION



Become a superhero in this unique 64K action adventure. Great graphics and sound effects! See 5/87 Rainbow review. Disk $19.95.

DRAGONBLADE

Another great 64K animated adventure! Can you obtain the enchanted sword to slay the evil dragon? See 11/86 Rainbow review. Disk $19.95.

WHITE FIRE OF ETERNITY

Enter the era of monsters and magic in this splendid 64K animated adventure! See 12/86 Rainbow review. Disk $19.95.

Sundog systems

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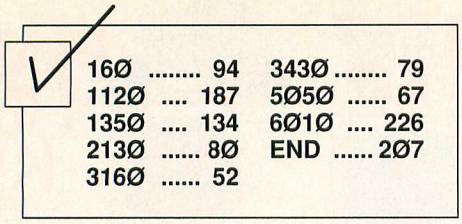

16Ø	94	343Ø	79
112Ø	187	5Ø5Ø	67
135Ø	134	6Ø1Ø	226
213Ø	8Ø	END	2Ø7
316Ø	52		

The listing: KINDRFUN

```
Ø ' COPYRIGHT 1989  FALSOFT,INC
5 REM KINDERFUN (C) 1986 BY
  LINDA FALGE
1Ø CLS(Ø)
2Ø FORX=1ØTO5Ø:Y=1Ø:SET(X,Y,7):N
EXTX
3Ø FORX=49TO5Ø:FORY=1ØTO2Ø:SET(X
,Y,7):NEXTY:NEXTX
4Ø FORX=5ØTO1ØSTEP-1:Y=2Ø:SET(X,
Y,7):NEXTX
5Ø FORX=11TO1ØSTEP-1:FORY=2ØTO1Ø
STEP-1:SET(X,Y,7):NEXTY:NEXTX
6Ø FORX=1TO63:Y=5:Z=28:SET(X,Y,6
):SET(X,Z,6):NEXTX
7Ø PRINT@235,"kinderfun";
8Ø PRINT@392,"by";:PRINT@395,"li
nda";:PRINT@4Ø1,"falge";
9Ø PLAY"O3;L4;G;L8;G;L8;F;L4;E-;
L4;G;L4;A-;L8;A-;L8;G;L2;F;L4;E-
;L8;C;L8;D;L8;E-;L8;F;L8;G;L8;A-
;L8;G;L8;B-;L8;B-;L8;B-;L8;F;L8;
B-;L8;B-;L8;B-;L4;E-;L8;C;L8;F;L
4;E-;L8;E-"
1ØØ FORX=1TO3ØØØ:NEXTX
11Ø CLS
12Ø PRINT"PRESS THE NUMBER OF YO
UR CHOICE"
13Ø PRINT@133,"1. NICE TO MEET Y
OU"
14Ø PRINT@165,"2. COLORS AT RAND
OM"
15Ø PRINT@197,"3. COUNTING UP!"
16Ø PRINT@229,"4. LETTERS-LETTER
S"
17Ø PRINT@261,"5. DRAWING BOARD"
18Ø PRINT@293,"6. MUSIC TO YOUR
EARS"
19Ø PRINT@449,"PRESS <CLEAR> TO
RETURN HERE"
2ØØ A$=INKEY$:IFA$=""THEN2ØØ
21Ø IFA$=CHR$(12)THEN2ØØ
22Ø A=VAL(A$)
23Ø IFA=ØTHEN2ØØ
235 IFA>6THEN2ØØ
24Ø IFA=1THEN1ØØØ
25Ø IFA=2THEN2ØØØ
26Ø IFA=3THEN3ØØØ
27Ø IFA=4THEN4ØØØ
28Ø IFA=5THEN5ØØØ
29Ø IFA=6THEN6ØØØ
1ØØØ CLS
1Ø2Ø PRINT"HELLO, WHAT IS YOUR N
AME?"
1Ø3Ø INPUT A$
1Ø4Ø FORN=1TO12
1Ø5Ø C=RND(8):IFC=1THENC=2
1Ø6Ø X=RND(2Ø):Y=Y+32
1Ø7Ø CLS(C):PRINT@X+Y,A$;
1Ø8Ø S=RND(1ØØ):SOUNDS,1
1Ø9Ø FORX=1TO5Ø:NEXTX
11ØØ NEXTN
111Ø FORX=1TO5ØØ:NEXTX
112Ø CLS:PRINT"HOW OLD ARE YOU,
"A$"?"
113Ø INPUTB
114Ø CLS
115Ø PLAY"L255V31;1;2;3;4;5;6;7;
8;9;1Ø;11;12"
116Ø FORX=1TO29:Y=16Ø:Z=32Ø:PRIN
T@X+Y,B:PRINT@X+Z,B:NEXTX
117Ø PLAY"L255V31;1;2;3;4;5;6;7;
8;9;1Ø;11;12"
118Ø PRINT@16Ø,"":PRINT@32Ø,""
119Ø FORX=1TO2Ø
12ØØ PRINT@237,B:SOUND5Ø,1
121Ø PRINT@237,"":SOUND1ØØ,1
122Ø NEXTX
123Ø FORX=1TO5ØØ:NEXTX
124Ø CLS
125Ø FORX=1TO48ØSTEP32:Y=1:PRINT
@X+Y,A$:NEXTX:PLAY"L1ØØV31;1Ø;9;
8;7;6;5;4;3;2;1"
126Ø FORX=1TO48ØSTEP32:Y=11:PRIN
T@X+Y,A$:NEXTX:PLAY"L1ØØV31;1Ø;9
;8;7;6;5;4;3;2;1"
127Ø FORX=1TO48ØSTEP32:Y=21:PRIN
T@X+Y,A$:NEXTX:PLAY"L1ØØV31;1Ø;9
;8;7;6;5;4;3;2;1"
128Ø FORX=1TO5ØØ:NEXTX
129Ø CLS(7):PRINT@71," NICE TO M
EET YOU ";
13ØØ FORX=1TO3Ø:PRINT@288,"
      "A$"!!":SOUND15Ø,1
131Ø PRINT@288,"":SOUND1ØØ,1
132Ø NEXTX
133Ø FORX=1TO5ØØ:NEXTX
134Ø CLS:PRINT"PRESS <CLEAR> TO
RETURN TO MENU"
135Ø PRINT:PRINT"PRESS <SPACEBAR
> TO PLAY AGAIN"
136Ø A$=INKEY$:IFA$=""THEN136Ø
137Ø IFA$=CHR$(32)THEN1ØØØ
138Ø IFA$=CHR$(12)THEN11Ø
139Ø A=VAL(A$):IFA=Ø THEN136Ø
14ØØ IF A>=1 THEN 136Ø
2ØØØ CLS:PRINT"COLORS ARE DISPLA
YED AT RANDOM"
2Ø1Ø PRINT"LOCATIONS ACROSS THE
SCREEN."
2Ø2Ø PRINT:PRINT:PRINT"YOU SELEC
T THE COLORS BY"
```

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```
2030 PRINT"PRESSING NUMBERS (1-8
)."
2040 PRINT:PRINT"PRESS ANY NUMBE
R (1-8) TO BEGIN."
2050 PRINT"PRESS <E> TO ERASE TH
E SCREEN"
2060 PRINT"FOR NEW COLORS."
2070 PRINT:PRINT"PRESS <CLEAR> T
O RETURN"
2080 PRINT"TO THE MENU."
2090 A$=INKEY$:IFA$=""THEN2090
2095 IFA$=CHR$(12)THEN110:IFA$=C
HR$(13)THEN2110
2100 A=VAL(A$):IF A=0 THEN 2090:
IF A>=1 THEN 2090
2110 CLS(0)
2120 A$=INKEY$:IFA$=""THEN2120
2130 IFA$=CHR$(12)THEN110
2135 IFA$="E"THEN2110
2140 C=VAL(A$):IFC=9THENC=0
2150 IFC=0THEN2120
2160 IFA$<>""THENPLAY"L255V31;1;
2;3;4;5;6;7;8;9;10"
2170 FORX=1TO63:Y=RND(31)
2180 SET(X,Y,C):NEXTX
2190 GOTO2120
3000 CLS:PRINT"FILL IN THE CORRE
CT ANSWER"
3010 PRINT"AND THE COMPUTER REWA
RDS YOU"
3020 PRINT"WITH A MULTI-COLORED
BAR."
3030 PRINT:PRINT"IF AN ANSWER IS
 WRONG FIVE"
3040 PRINT"TIMES IN A ROW, THE C
OMPUTER"
3050 PRINT"WILL SUPPLY THE CORRE
CT ANSWER."
3060 PRINT:PRINT"PRESS ANY KEY T
O BEGIN."
3070 PRINT"PRESS <CLEAR> TO RETU
RN"
3080 PRINT"TO THE MENU."
3090 A$=INKEY$:IFA$=""THEN3090
3100 IFA$=CHR$(12)THEN110
3110 CLS
3120 FORY=15TO31STEP4
3130 A=RND(95):IFA<6THEN3130
3140 B=A+1:C=B+1:D=C+1
3150 PRINT@98,A
3160 PRINT@104,B
3170 PRINT@110,C
3180 PRINT@116,D
3190 PRINT@154,"--"
3200 FORZ=1TO5
3210 A$=INKEY$:IFA$=""THEN3210
3220 IFA$=CHR$(12)THEN110
3230 E=VAL(A$)
3240 PRINT@122,A$
3250 B$=INKEY$:IFB$=""THEN3250
3260 F=VAL(B$)
3270 PRINT@122,A$+B$
3280 IF(E*10)+F=D+1THEN3340
3290 FORX=1TO100:NEXTX
3300 PLAY"L200V31;1;2;3;4;5;6;7;
8;9;10"
3310 PLAY"L200V31;10;9;8;7;6;5;4
;3;2;1"
3320 NEXTZ:PRINT@121,(A+4)"##":F
ORS=1TO30:SOUND200,1:NEXTS
3330 GOTO3110
3340 FORX=1TO63
3350 C=RND(8):IFC=1THENC=7
3360 SET(X,Y,C):NEXTX
3370 PLAY"L50;1;2;1;2;3;4;3;4;5;
5;5;5;5;10;10;10;10;10;10"
3380 NEXTY
3390 CLS(0):FORX=1TO100
3400 Q=RND(63):W=RND(31):C=RND(8
):SET(Q,W,C)
3410 S=RND(50):SOUNDS,1
3420 PRINT@233," VERY GOOD!! ";
3430 NEXTX:GOTO3110
4000 CLS:PRINT"PRESS ANY KEY TO
BEGIN."
4010 PRINT:PRINT"THE SCREEN WILL
 CLEAR AND"
4020 PRINT"YOU MAY PRESS ANY KEY
S.
4025 PRINT:PRINT"PRESS THE LEFT
ARROW (BACKSPACE)TO DELETE CHARA
CTERS."
4030 PRINT:PRINT"PRESS <CLEAR> T
O RETURN"
4040 PRINT"TO THE MENU."
4050 A$=INKEY$:IFA$=""THEN4050
4060 IFA$=CHR$(12)THEN110:IFA$=C
HR$(13)THEN4110
4110 CLS
4120 FORH=0TO30
4130 IFH=29THEN4110
4140 A$=INKEY$:IFA$=""THEN4140
4145 IFA$=CHR$(12)THEN110
4150 IFA$=CHR$(8)THENH=H-1:GOTO4
140
4160 IFA$<>""THENPLAY"L255V31;1;
2;3;4;5;6;7;8;9;10;11;12"
4170 FORX=1TO480STEP32:PRINT@X+H
,A$:NEXTX
4180 NEXTH
5000 CLS:PRINT"USE THE ARROW KEY
S TO MOVE"
5010 PRINT"THE CURSOR IN ANY DIR
ECTION."
5020 PRINT:PRINT"PRESS <E> TO ER
ASE THE BOARD"
5030 PRINT"FOR A NEW DRAWING."
5040 PRINT"PRESS <C> TO CHANGE T
HE COLOR"
5050 PRINT"OF YOUR LINE."
5060 PRINT:PRINT"PRESS ANY KEY T
O BEGIN."
5070 PRINT"PRESS <CLEAR> TO RETU
RN"
```

```
5080 PRINT"TO THE MENU."
5090 A$=INKEY$:IFA$=""THEN5090
5100 IFA$=CHR$(12)THEN110:IFA$=C
HR$(13)THEN5105
5105 H=3:V=3:C=1
5110 CLS(0)
5120 A$=INKEY$
5130 IFA$=CHR$(9)THEN H=H+1
5140 IFA$=CHR$(10)THEN V=V+1
5150 IFA$=CHR$(8)THEN H=H-1
5160 IFA$=CHR$(94)THEN V=V-1
5170 IFH<2THENH=2
5180 IFH>62THENH=62
5190 IFV<1THENV=1
5200 IFV>31THENV=31
5210 IFA$="C"THENC=C+1:IFC>8THEN
C=1
5220 SET(H,V,C)
5230 IFA$="E"THEN5105
5240 IFA$=CHR$(12)THEN110
5250 GOTO5120
6000 CLS:PRINT"PRESS ANY KEY TO
BEGIN."
6010 PRINT"THEN PRESS ANY NUMBER
 (1-8)."
6020 PRINT:PRINT"THE NUMBERS REP
RESENT THE"
6030 PRINT"C SCALE ON A PIANO KE
YBOARD."
6040 PRINT:PRINT"PRESS <CLEAR> T
O RETURN"
6050 PRINT"TO THE MENU."
6060 A$=INKEY$:IFA$=""THEN6060
6070 IFA$=CHR$(12)THEN110:IFA$=C
HR$(13)THEN6110
6110 CLS
6120 A$=INKEY$:IFA$=""THEN6120
6130 C=VAL(A$)
6140 IFC=1THENCLS(C):PLAY"L402;C
":PRINT" C ";
6150 IFC=2THENCLS(C):PLAY"02;D":
PRINT" D ";
6160 IFC=3THENCLS(C):PLAY"02;E":
PRINT" E ";
6170 IFC=4THENCLS(C):PLAY"02;F":
PRINT" F ";
6180 IFC=5THENCLS(C):PLAY"02;G":
PRINT" G ";
6190 IFC=6THENCLS(C):PLAY"02;A":
PRINT" A ";
6200 IFC=7THENCLS(C):PLAY"02;B":
PRINT" B ";
6210 IFC=8THENCLS(C):PLAY"03;C":
PRINT" C ";
6220 IFA$=CHR$(12)THEN110
6230 GOTO6120
```


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1989 CoCo Tax Estimator, a BASIC09, *Multi-Vue*-compatible program for 512K CoCo 3s and OS-9 Level II that predicts the user's tax liabilities. It is based on the 1989 Form 1040 ES as printed by the Internal Revenue Service. *Puritas Springs Software, The Ameritrust Building, 17140 Lorain Ave., Cleveland, OH 44111, (216) 251-8085; free — send a formatted disk, a return mailer and appropriate postage.*

Auto-Park, a *Hyper-I/O* accessory program written in machine language that lets users specify an amount of time devices can remain idle before the resident program parks drive heads. Designed to help avoid head crashes. *KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, (407) 799-3253; $12.95 plus $1.50 S/H.*

BASIC Windows, a 100-percent machine language program for the 512K CoCo 3 that divides memory into six different multitasking windows so six programs can be run at once. *KB Enterprises, 435 Brightwaters Drive, Cocoa Beach, FL 32931, (407) 799-3253; $34.95 plus $1.50 S/H.*

Jack Rabbit Story Writer, an educational word-processor program to help children from grades 6 to 8 learn to compose and write short stories. Includes a spelling dictionary of over 7000 elementary-level words. Requires 64K ECB, a disk drive and a printer. *E.Z. Friendly, 118 Corlies Ave., Poughkeepsie, NY 12601, (914) 485-8150; $24.95 plus $1.50 S/H.*

KJV on Disk #40, the books of Jude and Revelation on disk in ASCII files for the CoCo 1, 2 and 3. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1656; $3.*

◈ **MouseCAT**, a mouseholder in the form of a cartoon cat that adheres to the side of a monitor with velcro. The mouse is cradled in the cat's arms and legs. *H&H Enterprises, Box 2672, Corona, CA 91718, (714) 737-1376; $6.95.*

OS-9 Pascal 2.0, a compiler and OS-9 implementation of Pascal that requires a 64K Color Computer and two disk drives. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $99.95, Cat. No. 26-3034.*

OS-9 Profile, a database management program featuring up to nine formats and nine sorting methods. *DynaCalc* files supported. Requires a 64K CoCo, at least one disk drive, the OS-9 operating system and a printer with a serial interface. *Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $49.95, Cat. No. 26-3274.*

The OS-9 Sourcebook 1988 Edition, a listing of OS-9 compatible hardware and software products, compiled from supplier catalogs and advertisements. *Microware Systems Corporation, 1900 NW 114th St., Des Moines, IA 50322, (515) 224-1929; free.*

The O.S.I.T.E. File, an Adventure program in which the player becomes a reporter snooping out suspicious goings-on at Outer Space Intelligence Transmission Enterprises, rumored to be harboring alien life forms. On tape or disk for the CoCo 3. *Tothian Software, Box 663, Rimersburg, PA 16248; $19.95 plus $2 S/H.*

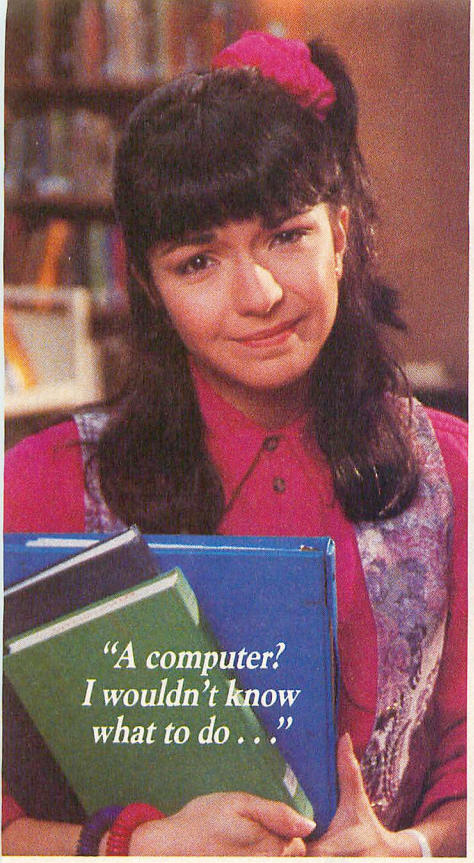
Trythis, a strategy game in which players must manipulate falling shapes so they fit like puzzle pieces at the bottom of the screen. Features three levels of play. Comes on tape or disk for 32K CoCos 1, 2 or 3; joystick optional. (A joystick-driven menu program is included with purchase.) *Gregory Software, Box 573, Kirkland, IL 60146, (815) 522-3593; $9.95 for tape or disk.*

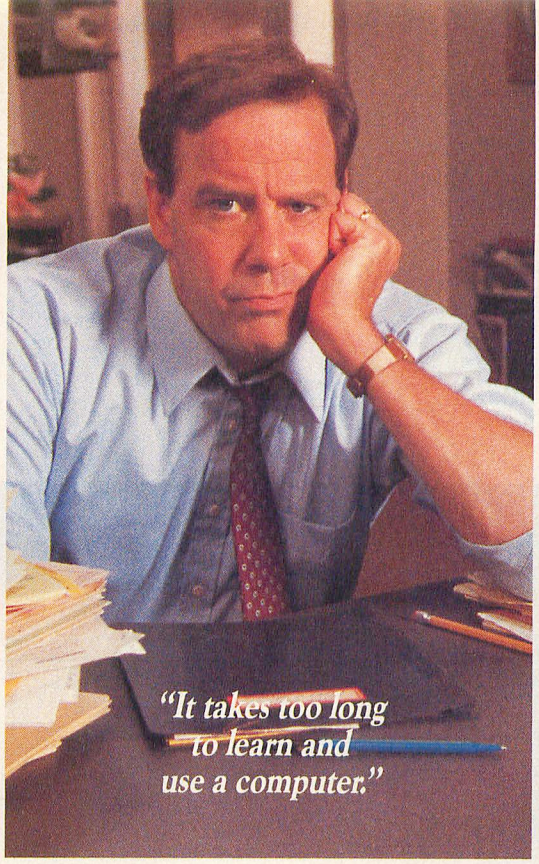
◈ **First product received from this company**

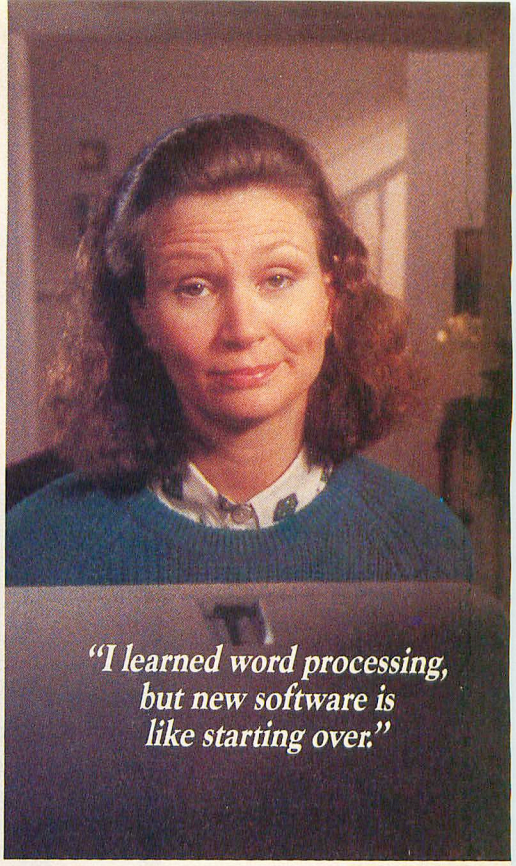
The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

—Lauren Willoughby







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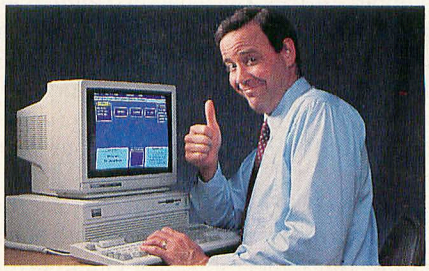

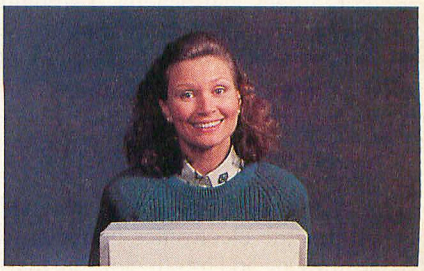

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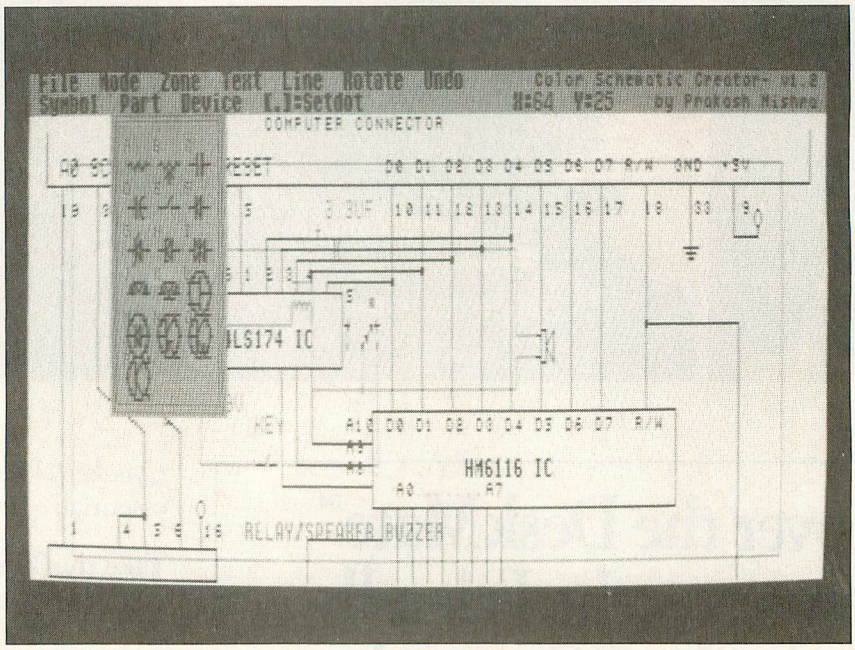

Software CoCo 3

Color Schematic Creator 1.2— Help in Making Your Circuits Light Up

Writers have word processors to manage their words, artists have graphic editors, but what do inventive hardware hackers have? Up until now, the answer has been colored pens and pencils, a straight edge, a lot of graph paper — and plenty of erasers. Fortunately, circuit designers and schematic drafters can now join the computer age thanks to programs like *Color Schematic Creator* from Microcom Software.

Color Schematic Creator is designed especially for the electronics hobbyist to aid in the drawing and printing of schematics. It comes on one floppy disk for the CoCo 3. Basically, what this program does is give users a way of drawing and labelling lines and symbols. Those of you who tune in to Tony DiStefano's "Turn of the Screw" column every month may be quick to point out that a graphics editor, with a little jury-rigging, suffices. But what sets *Color Schematic Creator* apart are such things as symbol tables, symbol rotation, "infinite" Undo capabilities, three circuit layers and a workspace of 640-by-1000 pixels (organized into 160-by-250 four-by-four pixel blocks).

The workspace is so large, in fact, that the screen displays only one-seventh of it at a time. Since there are three circuit layers that can be merged into one file, there are three workspaces, which makes plenty of room for most schematic work. The advantage of having layers is that you can have three full workspace-sized circuits in memory at the same time and still work on them individually. (Layers are color-coded to help you remember which is which.)

One of the best things about this program is its interface. In a word, it's simple. Those familiar with Microcom's *WordPower* can see some similarity. Users navigate *Color Schematic Creator* via pop-up dialog boxes and a menu bar with pull-down menus. In most cases, all you need to do is tap the first letter of a command — for example, to open a file you'd press F for File on the menu bar, then O for Open from the pull-down menu that results from invoking File.

Color Schematic Creator passed my acid test for ease of use — if I can sit down and load and run a program without reading the manual, then it's easy to use.

Well, I admit I had to read a bit of documentation on booting the program. *Color Schematic Creator* is not copy-pro-

tected, so you can make backups. You are *encouraged* to make backups. In fact, you can't run the program unless you've made a backup — the program disk is write-protected, and the program aborts with a WP Error if you jump the gun and try to run `BOOT` on the original program disk. Just making a backup is all there is to the installation process (unless you have a Tandy DMP printer, but we'll get to that later).

Color Schematics Creator is a good companion for the electronics hobbyist. Those who draft schematics know the hassle of redrawing time and time again. With Color Schematics Creator, if you don't get it right, you can edit and re-edit until you do.

When you have made your backup and thus are successful in running `BOOT`, you are greeted by a screen consisting of a mostly blank area (one-seventh of the workspace) and an ever-present two-line menu bar at the top, along with readings of the cursor's current *x* and *y* position. The *y* coordinate ranges from 0 to 255, but only 40 of those vertical "units" are displayed at one time. Another piece of information found on the menu bar is that *Color Schematic Creator* was written by Prakash Mishra, who is a computer systems engineering student. The menu bar offers 11 executable options, most of which result in pull-down menus offering yet more options: File, Mode, Zone, Text, Line, Rotate, Undo, Symbol, Part, Device and Setdot.

Again, all you have to do to execute any menu bar option is press the first letter: F for File, M for mode, etc. Setdot is a special case: Type a period as indicated on the menu bar.

The File menu takes care of disk I/O, the saving and loading of files, along with printing (either "Full Print" — all three layers and all screens; or "Part Print" — only the portion of the workspace currently onscreen). *Color Schematic Creator* thoughtfully provides what other programs so often leave out, a directory function.

The File menu also gives you control over your layers. You can load files into the Top, Mid and Low layers and merge them into your file. When shown together, the three layers are color-coded for easy differentiation.

The Mode menu is for control of layer display and joystick/monitor configuration. The Zone menu is what you use when you want to move to a segment of the workspace that is not displayed onscreen. Under Zone you can incrementally position yourself up or down, or you can jump to a specified coordinate. Regarding cursor control, each segment acts as if it were autonomous. It would be better if the user could scroll off the screen to reach another part of the workspace.

The Text menu yields text in three styles: normal, bold and small. Special characters are available in combination with the ALT key: ALT-O for Ohm, ALT-K for Kilo-Ohm. However, a μ is noticeably lacking. Text is treated almost as graphics; you cannot backspace to correct mistakes. Rather you must "undo" an entire line of text, then retype it. Onscreen text, however, is very

The Moguls of Microcom

Manohar Santwani and his son Chris came to the United States from India in 1982. Neither knew much about personal computers, although Manohar had dealt with mainframes in his job with industrial quality control in India's government. Both came to know PCs very well when Manohar bought Chris a CoCo for his birthday in 1983. Then the Community came to know *them* later that same year when they launched the fledgling Microcom, now just about the largest CoCo company outside of Fort Worth.

"We were the first company to bring out a book on peeks, pokes and execs," said Manohar of Microcom's first commercial product. He and Chris wrote it because they went to local Radio Shack to ask a question, and nobody there would give them "even one poke." They compiled a list of their own peeks and pokes and advertised it for $5 in a Color Computer magazine. The response was phenomenal.

Then they tried their hand at a utility allowing programmers to copy-protect computer cassettes — *Hide BASIC*. Then came another book — *Utilities Routines*, a book on machine language that annotated and explained 20 utility routines, describing how registers changed. Manohar said the book became a hit because assembly programmers were stingy with their routines, and beginning M/L programmers had to struggle to find information.

Microcom had produced five products and advertised them in various other magazines before the Santwanis stumbled across RAINBOW. A salesman in a local Radio Shack store asked if they subscribed to it. "RAINBOW, what's that?" They soon found out, and took out a small ad.

After this came another "Peeks, Pokes & Execs" book, which Chris Santwani authored. Then came an anti-pirating program for disk-based programs. Around 1985 they started a magazine on disk called the *CoCo Times*, which ran for two years. Next came *WordPower 3.2*, which Chris also wrote. That CoCo 3 word processor has become Microcom's flagship product.

After so much demand for hardware, they started making cables themselves. In 1986 they started dealing in third-party software. If you want it, chances are Microcom has it. In fact, if you want it but it doesn't exist, chances are that Microcom will contract the idea out to a programmer.

Color Schematic Creator is one of the "contracted" programs. "Basically we have a feeling for where the demand is. We see a gap and we try to fill it. That is the secret of our success." Microcom is now responding to customer demand for hard drives and OS-9 software. Santwani said hard drives are now his biggest seller.

In keeping with his philosophy, Manohar often answers his own technical support line — even though he runs a computer store in Rochester, New York, builds his own line of PC XT and AT compatibles under the brand name Aristo, and has opened a software training center for heavyweight MS-DOS applications. Also, he's breaking ground in Texas for an Aristo manufacturing plant, which is to be run by his brother-in-law.

Is this beginning to sound like Microcom's getting too big for the CoCo? "No! We rely on the CoCo," Santwani said, adding that his ranks of CoCo customers are growing, and that all his success is the result of the CoCo.

What's new from Microcom? *WordPower 3.3* looms on the horizon, with Manohar promising a July premiere. Also *CIIIPages*, a new kind of desktop publishing program. "There is nothing like this on the market," Santwani said. ❑

Schematic's Creator

Prakash Mishra, author of *Color Schematic Creator* and a 20-year-old in his third year at Rensselaer Polytechnic Institute as a computer systems engineering major, admits the CoCo was his first love. "I bought my first Color Computer way back about six years ago, in the 16K days."

When the first shipment of CoCo 3s arrived at his local Radio Shack, Pakrash bought the first one off the truck. Again there was an immediate affinity. "Of all the computers, the CoCo is the most well-designed," he says. "Even though Tandy never bragged about it, it was something we could brag about to our friends.

Prakash said he wrote *Color Schematic Designer* — "a mix of BASIC, assembly and other code" — to be easily upgradable. The printer drivers are separate from the program, which means they can be interchanged for different printers. "It would be easy to write a driver for a plotter", Prakash says, "more difficult to write one for a laser printer". He initially wrote *CSC* just a driver for Epson printers, particularly the Epson LX-80, LX-800 and FX-80 — those that have a "plotter mode." At Microcom's request he added a DMP driver.

Symbols can be added to the program through a file called SYMBMOD, which Prakash said is undocumented, unlicensed and basically got left on the disk by accident. "It is sort of self-explanatory," Prakash said. "All the symbols in the program are stored as DRAW strings. A person familiar with BASIC can use a text editor to open SYMBOLS.SYS and add DRAW strings into empty lines. They will show up in the menu — but be sure to update the number of symbols in the data file. This is not a selling point for the program, just for those who want to try it."

Lately Prakash's course of studies has pushed him more and more into the MS-DOS realm. "If I had more time I would like to write more programs for the Color Computer," he said. ❑

readable.

The Line menu is the heart of the program, letting you connect any two points with a solid ("Normal") or "Dotted" line. The Box option under Line is similar to the Normal line option, except it allows you to draw yourself along by your bootstraps, using the last endpoint as the next beginning point.

The Undo menu lets you take back things you have drawn, from your two most recent symbols to the first line you put on the screen — it keeps track of everything. The Setdot command lets you place a dot on the screen as a marker indicating that two intersecting wires are electrically connected. The Rotate command permits rotation of schematic symbols in 90-degree increments.

Symbol, Part and Device finish out the list of remaining menu bar commands, and these all have to do with symbol selection. When you select one of these three options, you get menus of symbols. When you press its corresponding letter, a symbol appears and can be moved around by the arrow keys or a joystick. Press R if you want to rotate it, then ENTER to place it. The symbols look a little funny onscreen because they are squashed vertically in order to fit into the CoCo 3's 640-by-200 mode. The collection of symbols is basic, not extensive.

The Symbol menu offers general symbols for such items as terminal connectors, grounds and arrows. For parts such as resistors, capacitors, diodes and transistors you use the Part menu. Finally, the Device menu allows you to select, among other things, lamps and inductors. It also provides a basic set of logic gates.

Although you can use the joystick in addition to the arrow keys for drawing and placing lines and dots, you cannot use the joystick for selecting and executing commands. Users with two-button joysticks find it easier to set lines — the second button acts as the ENTER key for anchoring them to a point. Whether arrow keys or a joystick is used, the cursor is a little slow. It does autorepeat, however, and you can get diagonal movement by simultaneously holding down two adjacent arrows.

If you have an Epson-compatible printer running at 9600 baud, then you are ready to print. Tandy DMP owners, don't despair: All you have to do is run a program called TANDY.BAS to configure *Color Schematic Creator* to your printer. However, Tandy printers can carry out only the "Part Print" function; to take advantage of "Full Print," you need an Epson. If your computer runs at a baud rate other than 9600, you can change the configuration by editing a line in the BASIC BOOT program.

Another goodie *Color Schematic Creator* offers is its method of saving files — as mathematical "shapes" rather than as mere graphics screens. This means *Color Schematic Creator* is flexible regarding printers; it prints at a quality appropriate to the printing device you use. It also means the screen spends a bit of time redrawing itself. But files stored this way take up less room on the disk. The workspace is saved to disk in two files, one to hold the shapes and the other to hold text.

Although this program fills a need, there are a few definite shortcomings. The feature I missed most was a free-floating cursor and mouse support for point-and-click command operation; it takes a bit of time for the cursor to arrive where you intended it to be. Also, it would be nice if you could "lasso" objects, pointing to a capacitor and pulling it off to the side to make room for a resistor, etc. Pixel editing would be nice, too.

As it is, you must erase and redraw blocks or do a lot of undos to back up and fix something. The earlier the booboo, the worse the clean-up job. You might find it best to sketch out a rough version of your circuit before committing it to screen. *Color Schematics Creator* is geared more to printing out a final schematic diagram than for "free associating" your way to a finished product.

Prakash Mishra wrote *Color Schematics Creator* to be easy to upgrade. The printer drivers are written separately, not incorporated into the main program.

Color Schematics Creator is a good companion for the electronics hobbyist. Those who draft schematics know the hassle of redrawing time and time again. With *Color Schematics Creator*, if you don't get it right, you can edit and re-edit until you do.

(Microcom Software, 2900 Monroe Ave., Rochester, NY 14618, 800-654-5244; $39.95 plus $3 S/H)

—Geoffrey Hartman

Software CoCo 3

Revenge of the Mutant Miners— Irradiated Radicals Strike Back

Have you ever noticed that when Hollywood makes a blockbuster movie we can always count on a sequel? JR & JR Softstuff knows how well this works and has made a popular arcade game even better. The sequel I speak of here is *Revenge of the Mutant Miners* — a rewrite/update of *Mutant Miners*. *Revenge* is written just for the CoCo 3 and employs all the color and excellent graphic detail we have come to expect from this computer.

In the new version, you are again trapped in an abandoned uranium mine and must work your way through the various levels and interconnecting gridwork within the mine to your freedom. In order to do this you must travel over every square inch of the gridwork, filling it in as you go. Many areas have collapsed or have not been completed.

The game consists of 10 different play-

ing screens. If you complete all 10 screens, you are advanced to the next level of difficulty. At the top of the screen is a status line that displays your current level of difficulty, the score, screen number, a timer, the high score for the current session, and a heart with a number representing the lives (men) you have remaining. The timer is set at 7000 for each screen and begins counting down when you begin play. The number remaining on the timer is added to your score as you complete each screen.

You can increase your score as you move about the mine by jumping to get picks, shovels and lanterns.

You move about the mine with a joystick. Pressing the firebutton starts the action and also allows you to jump in order to avoid obstacles or to pick up objects. In order to avoid the deadly mutants, you will make use of the various ladders, transporters and spring boards. The mutants are guarding "urainimite," and they change colors between blue and brown during their most deadly cycles. If you get to the urainimite, you become temporarily invincible and can kill all mutants you come in contact with. In some cases their destruction creates such a blast that nearby ladders and transporters are damaged.

You can increase your score as you move about the mine by jumping to get picks, shovels and lanterns. Some screens also contain hearts that increase the number of lives you have left.

The action is fast and furious. If you want to stop and catch your breath, just press the P key; or if you have one of the newer two-button joysticks, you can press the second button to pause the game.

There is a configuration screen following the title screen that allows you to change many of the game's options: the number of players (one or two), the level of play (0 to 9), number of lives (1 to 9), starting screen (0 to 9), number of joysticks (one or two), and monitor type (RGB, composite or TV).

Revenge of the Mutant Miners requires a CoCo 3 with a minimum of 128K RAM, a disk drive and a joystick. The program is 100-percent machine language, nonprotected and fairly priced. Besides, it is warranted for a full year at a modest cost of $5 if you want a replacement. The software is attractively packaged and well-documented with easy-to-read instructions on loading and playing the game. *Revenge of the Mutant Miners* is sure to be a hit with arcade game lovers of all ages.

(JR & JR Softstuff, P.O. Box 118, Lompoc, CA 93438, 805-735-3889; $19.95 plus $3 S/H)

—Jerry Semones

Software CoCo 1, 2 & 3

Lesson Planner— A Scheduler for Teachers

The longer I teach, the more I find state and local officials require more paperwork. The key to the new push for accountability is exact recording of daily happenings in the classroom. As a long-time classroom user of the CoCo, I am amazed so few teachers use the power of the computer to lighten the load of record-keeping and classroom organization.

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Currently, my lesson plans are created on disk using *Telewriter-64*. While the *TW-64* word processor has worked out well, though tediously, for several years, a new program from Tothian Software, *Lesson Planner*, makes the creation of lesson plans a cinch by saving many keystrokes of repeated headings and listings.

Lesson Planner requires a CoCo 1, 2 or 3 with at least 32K and one disk drive, and is a well-organized attempt at reducing the repeated tasks involved in making daily lesson plans. It is written in BASIC and can easily be modified to comply with the requirements set forth by my state of Pennsylvania. A feature not explained in the brief, three-page (but adequate) manual is the ASCII portability of the program; files can be imported into a word processor capable of pulling in ASCII. This is useful when you have to prepare extensively formatted presentations.

Lesson Planner requires customization to reflect your classes and schedule. The manual, however, recommends running the program as is so the user can get a feel of how the program functions. The simplicity of this program allows users to begin to see the modifications necessary to adapt the program for their use.

To begin you simply enter `RUN "PLANNER"`. The initial menu lists seven options, including creation, printing and editing of lesson plans; printing a blank plan sheet; disk access functions; and exiting. Option 1, Create Lesson Plan, prompts you for the date and the day of the cycle (some schools operate on a five-day cycle, others on a six-day cycle). This is one of the customizing options.

The program remembers your daily schedule, including periods, class assignments, preparation periods, lunch and special duties. Periods that require no planning are automatically passed over. When the first period requiring planning is encountered you can either create a lesson plan from scratch or "grab" a previously saved lesson plan.

Choosing the first option steps you through the areas of a lesson plan allowing you to choose materials, objectives, procedures and evaluation methods from a menu. This list can be modified to suit your particular classroom needs. Each category menu can contain up to nine items of the user's choosing. After each selection from the menu has been made, the program allows you to add notes of explanation included in the disk file and the printout.

Saving the file breaks up the periods of the day and sends separate periods to the correct file for storage. When you request the save option, the amount of free disk space is assessed and displayed onscreen, allowing you to change disks if necessary. Each period of the day is brought up for saving and the user must decide to which file to send the day's plan. As the file grows you will have a day-by-day account of the progress of each lesson area.

This program would have been great when my school was going through Middle States Evaluation. We were required to keep this exact information on file cards. From these cards we assembled our curriculum guides, which were presented for inspection by the visiting team. Using the computer would have saved hours of tedious work by allowing the lesson files to be brought into the word processor for proper formatting.

Printing is done at 600 baud and produces a neat, easy-to-follow format that can be used by any teacher stepping into the classroom to substitute for a day or longer.

Unfortunately, I know just enough BASIC to get me into trouble. However, I would have no trouble making the required changes in the program. The manual assumes a basic understanding of how to edit program lines and does not go into detail on how to make the changes necessary to customize the program. It does indicate *where* to make the changes. These changes require some thought and planning to assure a smooth and concise printout but are not beyond the skills of even a novice at BASIC programming.

At the end of the program are the `DATA` statements that need to be amended to reflect your day. You must input the following: period names (1, 2, 3...5AB, 5C, 6, etc.), teacher daily schedule (one line for each day containing the content of each period), materials (up to nine items), objectives (up to nine items), procedures (up to nine items), evaluation technique (up to nine items) and filenames (up to 10 names).

I feel the most important feature of any program is ease of use. Flexibility is next on my list. Both of these needs are met by this program. While *Lesson Planner* is intended for the classroom teacher, it is easily adaptable for any instructor or person who works on a fixed schedule. The fact that the program is written in BASIC allows creative users to add features. I already see minor changes such as selectable baud rate or the insertion of printer codes to allow highlighting of areas of the printout. At $24.95 this program will pay for itself. However, there is no phone number available if you do require help. (When I have a question, I like a quick answer.)

To any teacher who has access to a CoCo and is facing the construction of a planned course or curriculum guide, I recommend investing the money and time it takes to use *Lesson Planner*. The investment will show a payback when your supervisor requests *your* planned course.

(Tothian Software, Inc., Box 663, Rimersburg, PA 16248; $24.95)

—Michael Kello

Software CoCo 1, 2 & 3

Memory Master— Extending Your Horizons

CoCo users are always looking for utility programs that do a lot of tasks at bargain prices. *Memory Master* is a combination of useful menu-driven utilities for Color Computers using Disk Extended BASIC Version 1.1 or 2.1. I tried it on my 512K CoCo 3 with excellent results, and it worked fine on my old gray CoCo 1 with 64K.

One of this software's strong points is that it utilizes dual windows, which enable the user to run two programs at once by following the specified procedures outlined in the well-documented 17-page instruction manual.

Memory Master is a unique hacker's program offering about all you could ask for in a disk and memory utility.

The program disk contains several versions of the program specific to the various models of the CoCo. There's even a version to run with a CoCo 3 and TV rather than a monitor. An included demo program illustrates how the window features work. One of *Memory Master*'s tricks is the way in which it gets around erasing existing memory when `LOAD` and `RUN` commands are executed. If you `SAVEM` the contents of Window 2 while you are in Window 1, you save the parameters of the running program and the variables in that window.

When you `LOADM` again and switch to Window 2, you find everything as you left it. `LOADM` and `SAVEM` do not work this way in standard BASIC because BASIC's operating system stores its stack between variable tables and string variables. When you re-`LOADM` your program, stack conflict causes a crash. *Memory Master* has moved the stack and taken other necessary steps to

make LOADM and SAVEM work in a very unique and powerful way. Using LOADM and SAVEM allows you to transfer unlimited amounts of program sections or data.

Memory Master is menu-driven and contains lots of options allowing you to examine and modify memory locations, disk tracks and sectors, and it also allows you to convert Hex and decimal numbers. You can use these features as a fast way to enter machine language listings. You can also send a 256-byte sector or a granule (nine sectors) from the disk into any area of memory you want to act as a buffer. You can reverse this process in the same manner. Using this technique, you are able to examine and repair code on the disk itself, then use the editor to change the bytes and send them back to the disk. During such data transfers the upper-left corner of the screen shows error status in bit form. Although not extremely useful, it is nice to watch, especially if you get an I/O Error. There is a printer option, too, that works in conjunction with the various memory and disk functions.

Memory Master is a unique hacker's program offering about all you could ask for in a disk and memory utility. The window feature is unusual and works well with most of the short programs I tried. However, *Memory Master*'s features are powerful and must be used with caution. Beginners should exercise extreme care, because it's possible to lose valuable programs and scramble disk files if you are not careful.

(Danosoft, P.O. Box 124, Station A, Mississauga, Ont. Canada L5A 2Z7, 416-897-0121; $24.95 US, $29.70 CDN, add $2.50 S/H)

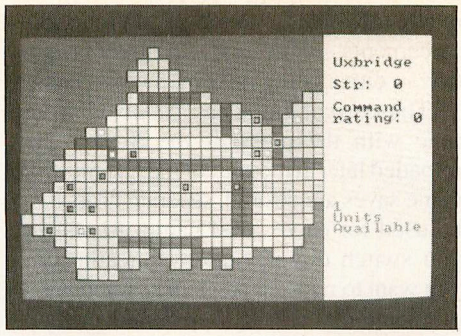
—David Miller

Software CoCo 3

Peninsular War— Make Napoleon Meet His Waterloo Before His Time

Peninsular War from SPORTSware is a new strategic simulation for disk-based CoCo 3 systems. Supplied on a single, nonprotected disk, it is accompanied by a five-page set of instructions. Because data (game saves) is written to the disk, SPORTSware encourages owners to play from duplicates created with the BACKUP command.

As explained in the documentation, the



scenario for *Peninsular War* revolves around the conflict between British and French forces during the Napoleonic War of 1805 to 1812. Historically, the British commander, Wellington, was victorious over the numerically superior French forces. (Note that Wellington did not actually face Napoleon until later, at Waterloo.)

The idea of the game is for the player to try to duplicate British successes in the campaigns; the goal is to occupy the French base at Bayonne. Generally the British are heavily outnumbered. The CoCo takes the side of the French and attempts to take the British base at Lisbon, Portugal. The game ends when either of the above objectives is attained.

Game play begins with a title screen, followed by a prompt for the user to start a new game or load a saved game. Once the choice is made, a map of Spain is displayed. The map is made up of a series of small squares, with different colors indicating the types of terrain. Ordinary terrain is light brown, mountains dark brown, rivers are light blue and cities are yellow. British and French units and commanders are highlighted by different colors.

It is with the color scheme that I found some problems. The programmer appar-

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ently assumes all users will be playing on RGB monitors. With RGB, the colors are well-defined and do the job just fine. However, on a TV (composite), some of the colors are very hard or impossible to see. Examining the code (written in BASIC), I found several calls to RGB specifically, which accounts for the TV display problems.

Playing *Peninsular War* is not difficult, but careful strategy is required to actually win. Each force starts off with four commanders, each having a varying degree of ability. A commander's ability must be considered when making bold moves. British commanders start off at random locations in western Spain while all of the French forces begin at Bayonne in eastern Spain.

Players move their British commanders via the arrow keys and shifted/unshifted comma and period keys. The movement distance is controlled by whether or not the commander is accompanied by troops. Movement over difficult terrain costs more in movement points than travel across ordinary land.

Options depend on current positioning of the individual commander. You can elect to pick up troops (P) if the area has troops available. Usually you pick up troops at cities in which they were earlier detached. An onscreen message notifies the player of troop availability. Likewise, the D key is pressed to "detach" troops. In either picking up or detaching troops, the user must key in the number of troops involved.

If a commander is accompanied by troops, he may elect to attack the enemy by pressing the A key. Attacks can be made on any adjacent square, including diagonally adjacent squares. Attack results are calculated by the computer using a combination of four factors: numerical strength, commander rating, terrain and supply status. This is all explained carefully in the documentation; understanding the system is vital to playing the game with any degree of success.

Defeat always results in automatic retreat, in a direction opposite the attack. For example, a defeat by enemy forces attacking from the north results in retreat to the south. A unit forced into the sea by retreat is completely destroyed. Likewise, units forced to retreat onto a space occupied by enemy troops are obliterated, regardless of respective strength.

Attrition from starvation, disease and weather is taken into account. Units can actually be wiped out by attrition, at which time they are removed from the map. New reinforcements arrive during each turn, always at Lisbon for the British. French reinforcements are added at their headquarters base at Bayonne only. Troop reinforcements are increased in direct proportion to cities being held by the two sides.

The current game can be saved at any time with the press of the S key, then reloaded later at the start of play. If multiple game saves are desired, separate disks must be used for each saved game. At startup, you switch disks prior to indicating that you want to reload a previously saved game. A selection of N at startup results in a new game.

Overall, I found *Peninsular War* to be an entertaining game for users who enjoy strategy and simulations. To run *Peninsular War*, a CoCo 3 with one disk drive is required. Although not required for the program to work, an RGB monitor comes highly recommended, for the reasons discussed earlier. At an advertised price of only $21, *Peninsular War* is an interesting alternative to shoot-'em-up arcade games.

(SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, 419-389-1515; $21)

—Leonard Hyre

Software CoCo 1 & 2

Foods II— Find Out If You Are What You Eat

Diet conscious? Thinking of getting a new scale because the numbers on the old one are too high? Maybe you should buy *Foods II* instead, because that old scale is probably right!

With this program and other diet reference materials, you can maintain a proper diet. If your doctor has recommended a special diet in regard to fat, protein and carbohydrate content, you can use *Foods II* to see how closely you are following instructions. Others will be interested for their own reasons. Most of the above does not apply to the very young, but the information helps teach them about good nutrition.

The first step is to print a form on which to list the daily menu by running the `6 DY FORM` program. At this point I have to warn you that you must have a printer that can underline and respond to reduced line spacing. The existing code is written for DMP-105/106 printers; some editing may be necessary. I used a DMP-110 and with some editing I produced a nice form. Without the editing, the form was much longer, but still usable. If you need help with your printer codes, the author is available by mail.

The sample form allows three days to be entered on each side and has a space for five supplements (you provide the statistics from the label or wherever); however, you may enter many supplements in the program.

The first thing you notice on the sample form is that the spaces are too short for words. Referring to the documentation, you find a food code list. The foods are grouped by type and are easy to find. A second set of papers has statistics of the complete list for study.

When you run *Foods II*, you find onscreen instructions explaining data entry — you can redo entries if necessary. The final results are not seen onscreen but rather are sent to the printer (so you must have the printer online!).

After entering the menu and any supplements, you have the choice of doing another day, starting over or ending. When you choose to end, an average of all days is printed. Since days vary, this helps you see if you have met your goal overall. The printout follows the numerical order of the codes, so you can enter a daily total of foods repeated during a day and save a line. (Note: The printout uses the names of the foods, not numbers.)

The printout shows an analysis of the food — protein, carbohydrates and fat, weight and calories, plus an overall total with percentages. Very complete.

Food II's nutritional information was taken from a health food almanac. The list includes 181 common foods. Other foods can be entered as supplements, but you must supply the statistics. Among the missing I noted cake, pie and artichokes. I only eat cake on birthdays and never eat pie, but artichokes are very popular here in California.

Look at product labels for nutritional information, but note that there probably are variations according to the way food is prepared. I do not use cooking oils, fry food or eat any fat that can be discarded. I am sure this changes the numbers somewhat. Use your good judgment. Sometimes you must compare the label with the listed amounts (e.g., hot dogs come in all-beef, chicken and turkey variations).

The documentation for *Foods II* is good. The program runs on any version of the CoCo — 16K cassette or 32K disk. Instructions are given to print the form and run the program, plus there is nutritional information. The author will answer questions and give assistance by mail.

Foods II is for the person with a serious concern for diet analysis. It is certainly easy to use and saves a lot of time. The author provides sample printouts on request.

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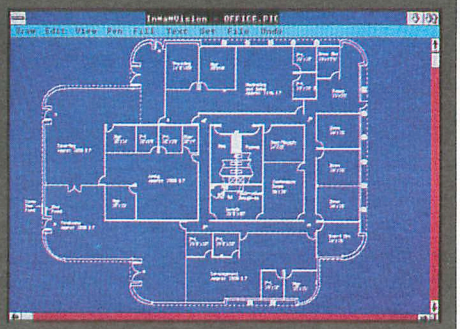
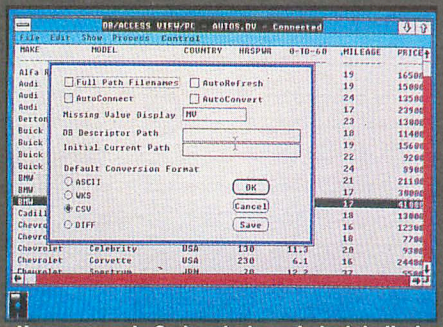


Next, you master Pascal, a multipurpose language often used to develop software for computer-aided design (CAD).



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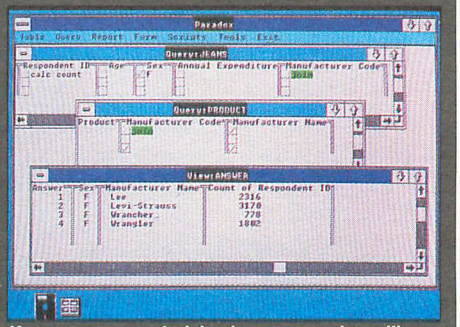

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(Mike Forrest, 14030 Peyton Drive, #203, Dallas, TX 75240; $20 disk or cassette)

—Audrey DeLisle

Software CoCo 3

Wargame Designer II— The Battle Rages On

"Well, one day you're comp'ny commander;
The next day you're out on KP.
So take down your service star, Mother;
Your son's in the R.O.T.C."

Imagine a group of cadets singing that song, to the tune of "My Bonnie Lies Over the Ocean"; you're playing the R.O.T.C. module in *Wargame Designer II*, SPORTSware's latest version of invent-it-yourself mayhem for the CoCo 3 with a disk drive. In that module, the Red Team is pitted against the Blue Team, but the singing comes only from your nostalgia bank, if applicable.

If you're not familiar with *Wargame Designer*'s first version, see the review in the August 1988 RAINBOW. That review describes how you can either play the battle modules available with the designing system or totally design your own computerized wargame for one or two players. You can build your own terrain features, designate how they affect movement and combat power, plus develop your own Order of Battle and that of the enemy. Then you could play against either the computer or another person. That review also discusses the terrific graphics.

Wargame Designer II kept the basic build-a-battle capabilities, removed the two-player option, but added some new features.

Wargame Designer II kept the basic build-a-battle capabilities, removed the two-player option, but added some new features. First of those is the option to use either the keyboard or joysticks when designing and playing the game. Plus the spacebar now controls the "Pen Up" and "Pen Down" function, also making things easier.

Next is the "Erase" command during icon design. With it, you destroy artwork but fill the designing box with whichever color is currently in use. This is a fast way to put in the background color. The similar command when designing the map is "Fill." This is very handy if most of the map you're designing is all the same terrain.

Next comes "Flip," the command used to design two armies at once. Design one unit type, flip and duplicate it in the other army in a different color. Speaking of flipping, the Z key allows you to switch from keyboard to joystick mode almost at will. This is important since the Save and Fill mode must be accomplished in keyboard mode.

"Some mothers have sons in the Army;
Some mothers have sons overseas.
But take down your service star, Mother;
Your son's in the R.O.T.C."

Another extremely handy feature of *WGD II* is that movement costs are assigned to the already-provided terrain features. Obviously you can override them if

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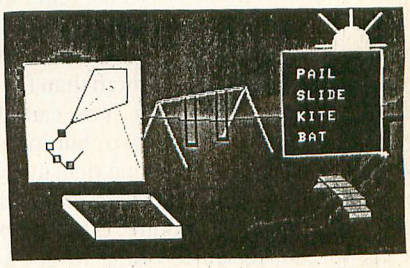

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RAINBOW CERTIFICATION SEAL

you want. ("If trees were a factor of 3, what should junkyards be?")

For those of you possessing neither the August '88 RAINBOW nor *WGD I*, be advised that this is one heck of a way to get around having to hunt somebody down to play a wargame with you. You play the computer, and can fiddle with its approach to things as you like by assigning different aggression factors to the computer's units. The instructions are clear, concise and complemented by menus within the program. As mentioned before, the two-player option is gone. According to SPORTSware, there just wasn't that much demand for it.

The program is not copy-protected since you have to make up a different disk each time you design a different scenario. The number of battles you re-enact is limited only by your research and how much your household chores and mundane things like school or a job get in the way of a really good war.

Something not mentioned last August is the fact that if an artillery-type unit (including archers) attacks an enemy unit alone and from long range, it cannot suffer combat casualties from that enemy unit. This is a definite advantage to the skilled artillerymen (sometimes referred to as door-closers and rope-pullers), those who believe the adage about artillery being the King of Battle. Cagey artillery use in *Wargame Designer*, as in actual combat, can be a vital factor in victory.

R.O.T.C., by the way, stands for Reserve Officers Training Corps, the largest source of commissioned officers the armed services have, through the country's colleges and universities. In addition to classes and drills throughout the school years, there is a six-week summer camp — a gigantic practical exercise — between the junior and senior year. This is when most cadets learn the song. They also learn that some fool dropping bags of flour from an L-19 is supposed to be treated like an enemy bomber.

The set of two disks includes four battle scenarios: Invasion North, Attack on Moscow, the infamous R.O.T.C. and Fort Apache. This set of four scenarios is also in response to customers' desires. It seems there was more demand for them than for a disk-side full of other icons. You can always order an icon disk or two, but in the meantime you can begin fighting right away. It is important to note that the commands include a game-save feature. This helps you get to bed before it's time to get up again, even though you may not sleep well due to running operations options through your head.

P.S. to any current cadets: Study hard but remember this — the non-commissioned officers are the ones who make things happen. Without them, all of our high-falutin' plans are just so many pieces of paper.

(SPORTSware, 1251 S. Reynolds Rd. Suite 414, Toledo, OH 43615, 419-389-1515; $25)

—John M. Hebert

Software CoCo 1 & 2

Menu Maker— Setting Up a Point-and-Shoot System

Menu Maker is a utility for any model Color Computer and a disk drive. Written in BASIC, it is not copy-protected, so you can make a backup copy for safekeeping. The purpose of this program is to allow users to create handsome menu screens that can load disk programs with a single, simple keypress.

The user types `RUN "MENU"` and presses ENTER to boot the program. Then the program prompts for the following inputs:

- Border Selection — You can choose from red, blue, orange, yellow or any keyboard character. You can also choose not to have a border.
- Title Lines — You can choose title lines at the top and bottom of the menu screen if you want, customizing your menu with text of your choice.
- Menu Selections — This is where you enter the names of the programs you want to access from the menu.

Menu Maker is a snap to use. After you answer the various prompts, the program writes a new ASCII file to disk under a name you assign. Whenever you want to run a particular program, you simply move the cursor up or down the menu's list of filenames, stop next to the file you want to execute and press ENTER. Because the resultant program is written in ASCII format, it takes longer to load than if it were saved in BASIC. This is easy to overcome by simply resaving the file — BASIC will save it without the ASCII option.

There are restrictions on the number of filenames that can be displayed on the menu screen. When used, borders and title lines take up space that could otherwise be devoted to menu options. With no border or title lines, the maximum number of filenames that can be displayed is 12. Adding a border reduces this number by two. Each title line reduces the available number by one line. Title lines and menu options, by the way, are automatically centered on the screen to give the menu a professional appearance.

Menu Maker is a useful, easy-to-run utility. The program comes with a short instruction sheet, but it's easy to use even without instructions. The disk also includes an extra bonus — a program called `JOYDIR`, which allows you to select menu options with a joystick if you have one connected. *Menu Maker* is fun to use and would be a handy addition to your collection at a price that is hard to beat. This program is worth a look, especially if you have young children or disabled computerists in the house.

(Gregory Software, Box 573, Kirkland, IL 60146, 815-522-3593; $8)

—Jerry Semones

Software CoCo 3

Calendar and *Convert*— Making Dates and Translating Numbers

Have you ever been writing a program and needed to convert a number into binary, Hex or decimal? Or wanted to keep a calendar of appointments and important dates on your computer? Or even just wanted to see what day of the week June 15, 2082 might be? Then this set of programs could be for you.

Calendar and *Convert* are packaged together on one disk, accompanied by a five-page instruction manual. The programs are written in BASIC09 and run under OS-9 Level II. All you need to run them is a CoCo 3 (128K is fine), one disk drive and OS-9 Level II.

To convert numbers, just type `convert` at the shell prompt. *Convert* opens an overlay window so none of your current work is destroyed. The user is presented with a nine-option menu:

Decimal to Binary
Decimal to Hex
Binary to Decimal
Binary to Hex
Hex to Decimal
Hex to Binary
Decimal to ASCII
ASCII to Decimal
Quit

After selecting one of the first eight op-

tions, the user is prompted for the initial number. The equivalent in the chosen number system is then displayed. The user is asked if he wants another conversion of the same type. Answering *no* returns the user to the menu, while answering *yes* again prompts for the next number to be converted. To quit, just select Option 9 at the menu.

Convert works well, but I find it rather cumbersome to use. When programming, I convert numbers with my calculator, or, since I have *Multi-Vue*, I sometimes use the calculator that comes on the *Multi-Vue* desktop. *Multi-Vue*'s calculator will not work with binary, but conversion from binary to Hex and the reverse is trivial — I do it in my head. However, if you don't have *Multi-Vue* or a converting calculator and are tired of doing conversions on paper, you might want to get *Convert*.

Calendar covers 800 years, from 1600 to 2400. You boot it by entering `calendar` from the command line. *Calendar* also pops up its own overlay window to prevent work from being destroyed. When *Calendar* is called, it begins by asking the user for a month (January, February, etc.) and then for a year (1600 to 2400). It then displays the calendar for that month on the screen and asks if you would like a hard copy.

Calendar covers 800 years, from 1600 to 2400. You boot it by entering calendar from the command line. Calendar also pops up its own overlay window to prevent work from being destroyed.

Along with the *Calendar* program go several small BASIC09 modules, including: `ElongatedOn`, `ElongatedOff` and `Dates`. To use the hard copy feature, users must load the source for `ElongatedOn` and `ElongatedOff` and change printer control codes to match their printers. They then need to be saved and packed. The Dates module consists of a short program followed by data statements in the form of "month, day, year, message." The user can put information into this module, save it and then pack it. Then, when *Calendar* comes up, it will display all of the messages for the given month below the calendar. This way, the user can keep a list of important events that are displayed each time he looks at his calendar.

This may be useful for some people, but I think it is a hassle to have to type in data statements every time I want to add something to my calendar. I prefer the *Multi-Vue* calendar. However, if you don't have *Multi-Vue*, or want to print your calendars, you might want to give *Calendar* a try.

Calendar and *Convert* do what they are meant to, but with just a bit more bother than I am used to. Maybe I've been spoiled by *Multi-Vue*. In any case, if you've been waiting for converter or calendar programs running under OS-9, here they are.

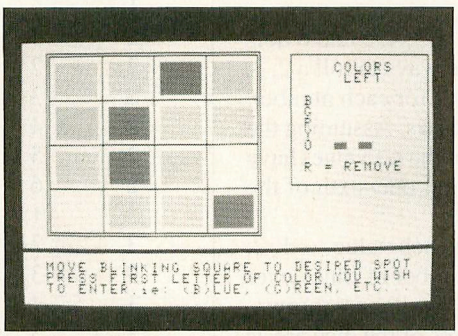
(Alan Hanusiak, 37 Grand Ave., Rockville, CT 06066, 203-875-2027; $24)

—Robert Marsa

Software CoCo 3

CoCo 3 Games Disk— Board Games for the CoCo 3

George and Ellen Aftamonow are big CoCo fans and have written a number of programs for our favorite computer. Their latest venture is a disk chock-full of games written for the CoCo 3 — appropriately named *CoCo 3 Games Disk*. These games and puzzles take advantage of the CoCo 3's colors and Hi-Res capabilities.



The programs are all easy to run — just enter `RUN"BOOT"` and the colorful main menu pops up. You select the game of your choice by moving the cursor to point to your selection and then pressing ENTER. There are 10 selections to choose from, divided up into brainteasers, puzzles and two-player games.

Swap Around is a game in which you must swap circular red markers with blue ones, and you can move only vertically or horizontally. *Swap Around* is fun to play and reminds me of the old-time cereal-box puzzles.

Up Top is similar; in this game you move colored markers vertically in specified steps. The object is to get all the markers to the top, but this is not easy. The rules of the game won't allow a move when a marker of the same color is in the row moved to. There are other rules to make this one a real brain-buster.

Daisy is the eternally popular "loves me . . . loves me not" game in which you try to beat the computer in pulling off the last petal from the flower. *Daisy*'s graphics are very good and interesting to watch being drawn.

Hare and Hounds is a fun game that pits two players against each other; the object is to be the first to reach the other end of the board. In this game, strategy is an important element.

Trap is a two-player game in which the game grid is laid out in an X-format. The object is to prevent your opponent from being able to move his/her colored marker. It's similar to Tic-Tac-Toe but more fun.

Switch-a-roo is a grid-like puzzle whose object is to interchange colored markers on vertical or horizontal lines. This one is a lot harder than you might think.

Colored Square is a game in which the object is to fill in grid blocks with colors so that no color is repeated vertically, horizontally or diagonally. Seventeen blocks and five colors are used. This one is tough, too.

By the Numbers is a puzzle containing eight squares interconnected with lines. The object is to put the numbers 1 through 8 into these blocks, but no sequence is allowed on interconnected blocks. This one is fun and even I could solve it after several tries.

Indian Giver is a two-player game in which each player places his marker on an unoccupied square. Then colored markers are placed next to them, which in turn removes adjacent markers. The player ending up with one marker wins. This one is really tough and quite a challenge.

Letters is a scrambled-word puzzle. The object is simply to unscramble the letters to form a word. Just to make it tougher, though, you can only move letters attached by lines. Each scrambled word is different and there are many to solve.

CoCo 3 Games Disk is a nice product at a very fair price. I liked the neat sound effects and closing graphics used on each of the games and puzzles. If you like strategy games and puzzles, you'll like this program.

(Aftamonow Software, 46 Howe St., Milford, CT 06460, 203-878-3602; $10)

—Jerry Semones

Barden's Buffer

Loose Ends and CoCo Outputs

By William Barden, Jr.
Rainbow Contributing Editor

This month is the time to tie together some loose ends pertaining to the "Perplexing Puzzles" article in my June column. I'm also including some material on how to provide real-world outputs from the CoCo to match the real-world inputs mentioned in the May issue.

Judging from the mail I received, many of you are puzzle freaks. The June column of perplexing puzzles prompted many interesting responses. Let me mention a few of the solutions.

Puzzle 1: Dice Odds

A pair of dice has six faces per die with 1, 2, 3, 4, 5 and 6 dots per face. Provide a program that lists all of the ways to roll a 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12; and give the odds for each number.

If a single die is rolled, a 1, 2, 3, 4, 5 or 6 shows. Assuming the die is legitimate and properly balanced, each of the six values have an even distribution — each value shows about one-sixth of the total number of times over the long run.

Now assume a second die is rolled. Again each value — 1, 2, 3, 4, 5 or 6 — shows one-sixth of the total number of times over the long run. If we consider the order in which the dice are thrown, the permutations that come up in 36 ideal tosses of the dice are as shown in Table 1.

Counting the number of ways to make a point: There is one way to make a two (1+1); two ways to make a three (1+2 and 2+1); three ways to make a four (1+3, 2+2, 3+1); four ways to make a five (1+4, 2+3, 3+2, 4+1); five ways to make a six (1+5, 2+3, 3+3, 3+2, 5+1); six ways to make a seven (1+6, 2+5, 3+4, 4+3, 5+2, 6+1); five ways to make an eight (2+6, 3+5, 4+4, 5+3, 6+2); four ways to make a nine (3+6, 4+5, 5+4, 6+3); three ways to make a ten (4+6, 5+5, 6+4); two ways to make an eleven (5+6, 6+5); and one way to make a twelve (6+6). The total number of ways equals 1+2+3+4+5+6+5+4+3+2+1 or 36 ways.

First	Second	Total Points	First	Second	Total Points
1	1	2	4	1	5
1	2	3	4	2	6
1	3	4	4	3	7
1	4	5	4	4	8
1	5	6	4	5	9
1	6	7	4	6	10
2	1	3	5	1	6
2	2	4	5	2	7
2	3	5	5	3	8
2	4	6	5	4	9
2	5	7	5	5	10
2	6	8	5	6	11
3	1	4	6	1	7
3	2	5	6	2	8
3	3	6	6	3	9
3	4	7	6	4	10
3	5	8	6	5	11
3	6	9	6	6	12

Table 1

The odds of making a total count of 2 through 12 are shown in Table 2.

Milt Poulos of Bound Brook, New Jersey, sent a nicely formatted version of this solution. However, one of the shortest solutions was from John Friedrich of Natrona Heights, Pennsylvania. The listing and final output are shown in Table 3.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

Total	Odds	Total	Odds
2	1/36	8	5/36
3	2/36=1/18	9	4/36=1/9
4	3/36=1/12	10	3/36=1/12
5	4/36=1/9	11	2/36=1/18
6	5/36	12	1/36
7	6/36=1/6		

Table 2

Puzzle 2: Cryptarithm

Find a CoCo-related cryptarithm to fit the form:

```
  XXXX
+ XXXX
------
 XXXXX
```

In the original problem I used the prime numbers 2, 3, 5 and 7. In the challenge I left it open just to see what readers would come up with. Puzzle Freak Paul Johnson of San Francisco came up with about 60 solutions using powers of two digits — 1, 2, 4 and 8. A typical solution is:

```
  8228
+ 4184
------
 12412
```

```
10 DIM A$(12):FOR X=1 TO 6:FOR Y
=1 TO 6:A=X+Y:A$(A)=A$(A)+HEX$(X
)+HEX$(Y):NEXT Y,X
20 FOR X=2 TO 12:PRINTX;:N=LEN(A
$(X))/2:FOR Y=1 TO LEN(A$(X))-1
STEP 2:PRINTMID$(A$(X),Y,1);"&";
MID$(A$(X),Y+1,1);" ";:NEXT Y:PR
INTCHR$(8);N;CHR$(8);"/36":NEXT
X
```

2	1&1	1 /36					
3	1&2	2&1	2 /36				
4	1&3	2&2	3&1	3 /36			
5	1&4	2&3	3&2	4&1	4 /36		
6	1&5	2&4	3&3	4&2	5&1	5 /36	
7	1&6	2&5	3&4	4&3	5&2	6&1	6 /36
8	2&6	3&5	4&4	5&3	6&2	5 /36	
9	3&6	4&5	5&4	6&3	4 /36		
1Ø	4&6	5&5	6&4	3 /36			
11	5&6	6&5	2 /36				
12	6&6	1 /36					

Table 3:

One person commented, "The problem in this form is not too exciting, so perhaps I am missing something in your challenge." I won't reproduce Paul's code here, but it is a succinct program of about 18 lines.

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ADOS-3 (reviewed July 1987)

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ADOS for Coco 1 and 2 (reviewed June 1987)

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Puzzle 3: Data Compression

In the original puzzle I gave an example of Huffman coding, a way of compressing data to about 50 percent of the length of ASCII coding. I then asked for a scheme to drastically compress a list of 4096 common words known to both sender and receiver — words such as "cat," "CoCo" and "BASIC09." Many readers got the basic idea, which is to simply assign a number from 0 to 4095 to represent each of the words. Since 0 to 4095 can be held in 12 bits, any word can be represented in about one and one-half bytes. If the average word length is 6 2/3 characters or about 6 2/3 bytes, the resulting data compression is about 78 percent.

Milt Poulos showed an example and said, "A scheme like this was used in telegraphy to transmit the ideograms used in Chinese and Japanese written communications. Each sending/receiving station had a copy of a dictionary in which the ideograms were assigned numbers. As the code numbers were received, a clerk translated them to the corresponding ideograms." Fascinating!

Puzzle 4: Cubes of Digits

Are there any numbers equal to the sum of the cubes of their digits? For example, the cubes of the digits of 126 are 1, 8 and 216. The sum of the cubes of the digits is 1+8+216=225, not equal to 126 in this case.

Gilbert Roberts of Santa Barbara, California, found four numbers — 153, 370, 371 and 407 — that met this criterion. For example, the cubes of the digits in 371 are 27 + 343 + 1 = 371. Many other readers also found the answers. One of the shortest programs was from John Friedrich:

```
10 FOR X=0 TO 2916:X$=STR$(X):A=
0:FOR Y=2 TO LEN(X$):A=A+INT(VAL
(MID$(X$,Y,1)^3):NEXT:IF A=X THE
N PRINTX:NEXT:ELSE NEXT
```

0 1 153 370 371 407

An interesting comment from Sir Gilbert: "I am a veteran hang glider pilot and use my CoCo to run my garage hang-gliding instrument business. CoCo drills all the PC boards (1200 holes unsupervised in three hours), then sets the instrument up. There are nine motorized screwdriver adjustments, a heater, thermo-electric cooler, strip chart recorder, five solenoid valves, two mercury columns, a master altimeter, ten relays and a programmable power supply on the output side. Miles of BASIC and machine language relate these to six-voltage measurements at strategic points in the circuit. With five PIAs . . . it's a true killer CoCo." (A description of this system would make a fascinating article.)

Thanks to all who wrote in with answers to these puzzles, and sorry I'm unable to answer everyone directly.

The Other Side of the Story

In the May '89 issue of THE RAINBOW, I described various ways to read real-world inputs such as switches, temperature, water level and light intensity, using inputs from the CoCo joystick. Several readers have written to ask that I provide information about the "other" direction — using the CoCo to control such things as lights, AC motors and keyers for amateur radio transmitters. It can be done, as the "killer CoCo" description above indicates. But how?

To get the answer look at the options available for real-world outputs. There are three programmable ports on the CoCo:

- serial output port
- cassette output port
- I/O port via ROM cartridge

Serial (RS-232-C) Port

The serial port is a four-pin connector on the rear of the CoCo. It is generally used for CoCo printers — most Radio Shack printers have either serial or parallel capability. In serial communications data is sent out as a string of bits, usually seven or eight at a time, as shown in Figure 1. In addition to the data bits, a *start bit* and one or two *stop bits* are added to the string. The *bit time* for each bit is constant. For 300-baud (300 bits per second) communications, each bit occupies 1/300 second, or 3.33 milliseconds, and the total time to send a byte representing a character to be printed is 10 * 3.33 milliseconds, or 33.3 milliseconds. About 30 characters per second can be printed at 300 baud. (See Figure 1.)

The serial port is pictured in Figure 2. There are four pins. The TD pin transmits data to the printer or other serial device such as a modem. The RD pin receives data from the device. The ground pin is a common ground. The CD (Carrier Detect) is a standard serial communications input (Carrier Detect) used in modems or for status indications. (See Figure 2.)

All pins are connected to a chip called a PIA (peripheral interface adapter) or equivalent in the CoCo. The PIA can be programmed on a number of individual pins. Under program control in BASIC or assembly language, a PIA pin can be turned on or off. The BASIC interpreter in the CoCo, for example, contains

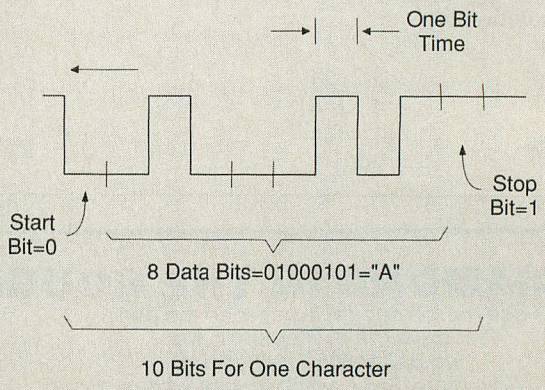

Figure 1: Serial Data for One Character

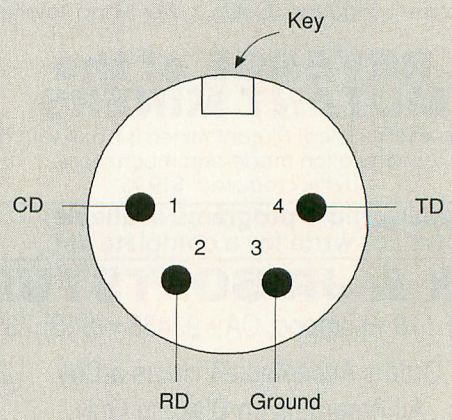

Figure 2: Serial Port Connections (Shown Looking In at End of 26-3020 Cable Connector)

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The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. ***Vocal Freedom*** turns your computer into a digital voice recorder. The **optional Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an **automatic message minder.** Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.

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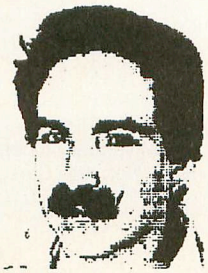

BASIC Freedom

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Vocal Freedom Hackers Pac.....$14.95
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assembly language code to convert a character into eight bits and then rapidly turn the PIA pin for the TD line on and off to represent the 1s and 0s of that character. Similarly the RD line can be read on another pin of the PIA to receive serial data.

The output on the PIA pins is about +5 volts for a one bit and about 0 volts for a zero bit — two binary levels. One problem, though, is that serial communications use different voltage levels, -3 to -12 volts for a one and +3 to +12 volts for a zero. The PIA output, therefore, is converted to these levels before appearing on the serial port TD pin. The RD and CD pins are input only as they also go through an opposite type of voltage-level conversion.

The current capability on the TD pin is limited to about 12/100 ampere because of a series 100-ohm resistor. The resulting current is enough to trip a small DC (Direct Current) relay but not enough to do much else with unless you have specialized digital logic circuits. (We'll describe the use of a relay in a moment.)

The main problem with using the serial port TD line is that you may already have a printer connected to the line, and it's a bother to unplug the printer cable and plug in an alternate control cable.

Cassette Port

The cassette port on the CoCo is used to read in and write out to a cassette tape recorder. The process is similar to serial communications, but a different coding scheme is used that provides from 500 to 1500 bits per second. There are five pins on the cassette port, as shown in Figure 3. The CASSOUT pin is the output to the tape recorder, the CASSIN is the input from the tape recorder, ground is a common ground, and the two REM pins control the tape recorder motor relay. (See Figure 3.)

Both the CASSOUT and CASSIN signals are controlled by a PIA in the CoCo. The CASSIN pin is input only. CASSOUT is meant to be an audio output only and does not have the current drive capacity to do useful things without specialized digital logic circuitry. This leaves us with the two REM pins. These are actually the outputs of a small relay contained within the CoCo. The relay is controlled by the PIA CASSMOT (cassette motor) pin and can be turned on or off, closing and opening the relay contacts under BASIC or assembly language. The BASIC commands to do this are `MOTOR ON` and `MOTOR OFF`.

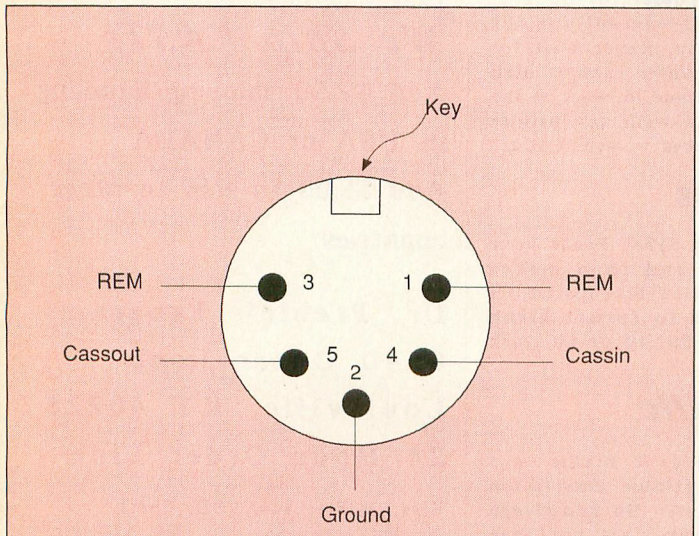

Figure 3: Cassette Port Connections (Shown Looking Into CoCo Connector)

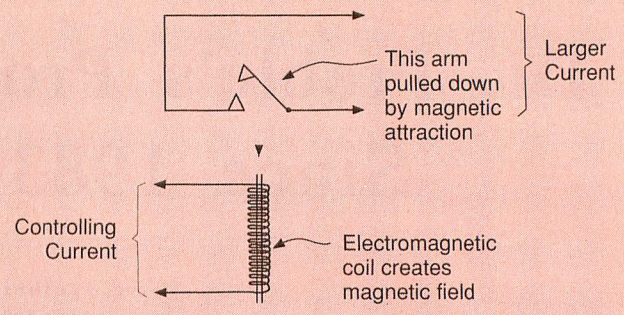
This arm pulled down by magnetic attraction
Larger Current
Controlling Current
Electromagnetic coil creates magnetic field

Figure 4: Relay Operation

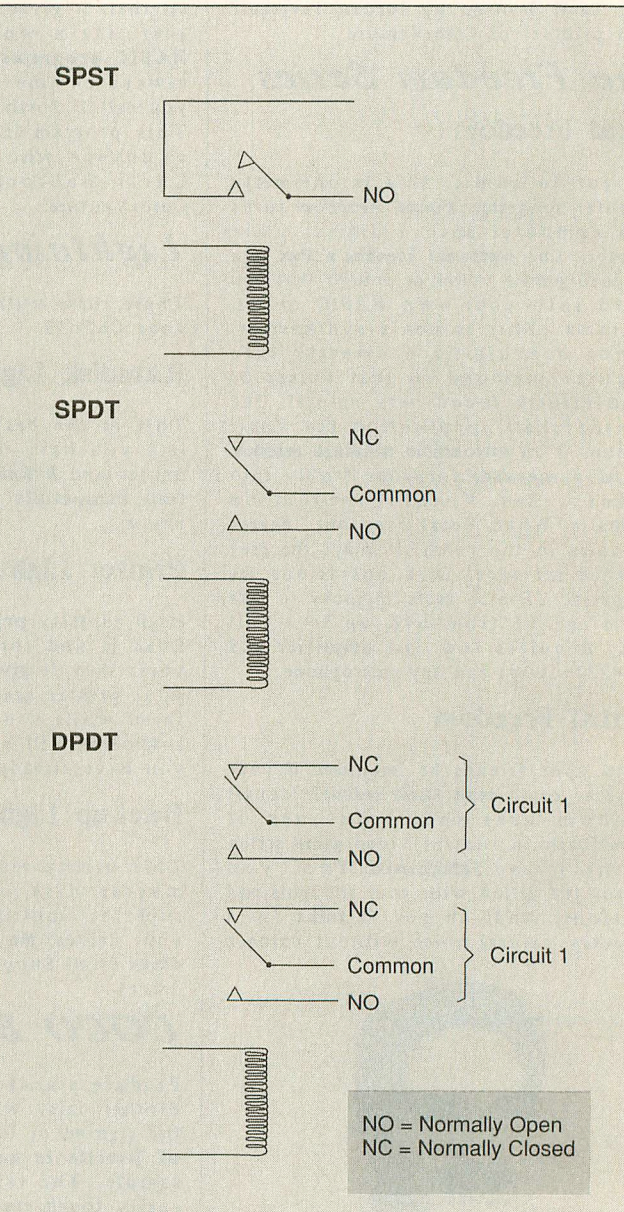

Figure 5: SPST, SPDT, DPDT Types

Relay Basics

At this point, then, we have a serial port line TD and the REM outputs from the cassette relay that can be used to control two external devices. Since the TD line should be connected to a relay, let's look briefly at what a relay is and does.

Relays are generally electromechanical devices that enable a small controlling voltage or current to switch a much larger voltage or current, as shown in Figure 4.

Some good examples of relays are in the Radio Shack catalog. In the catalog you'll find several specifications for relays. As discussed in the May column, an SPST relay allows an open/close switch contact controlled by the relay. An SPDT relay connects a common line to one line when the relay is energized and to another when the relay is not energized. A DPDT has two sets of SPDT contacts. The contacts can often control AC (house wiring) leads. These types are shown in Figure 5.

Warning

If you don't have experience handling AC power line (house wiring) circuits, don't even think about using your CoCo to control lights, appliances or other high-voltage devices with a relay. I've nearly been electrocuted twice and it is not a comfortable experience. One of the most dangerous conditions is temporary wiring that is forgotten and suddenly frays or breaks to become a lethal, hot circuit. If you're inexperienced, use the circuits shown here for low-voltage battery-operated devices only — there's plenty of opportunity for useful applications with this approach.

The coil of a relay is designed to operate with a certain voltage and a certain current. A 5VDC relay requires 5 volts of direct current to operate, a 7-9VDC relay requires seven to nine volts of direct current, and so forth. Current requirements are often expressed in *mA*, or thousandths of an ampere. A 20mA coil in a relay requires 20/1000 amps to operate.

Solid-state relays replace electromechanical relays with solid state circuitry. They are generally more reliable and less prone to deterioration.

Relays are energized when current at the proper voltage flows through the coil. The coil is basically an electromagnet that creates a magnetic field. The magnetic field pulls an arm down, closing the relay switch contacts.

There are several problems with relays. When current is first turned on to the coil, a surge of current is produced. The power supply to the coil has to be capable of supplying this surge current. Another problem is *contact arcing*. When a relay is energized and the switch contacts close to a motor or other inductive device, an electrical arc occurs. This mini-lightning bolt pits the contacts. Over long use, the contacts deteriorate. Another problem is the speed of the relay. Although relays operate in a fraction of a second, it may take 1/20th of a second for the relay contacts to close, bounce and finally settle down. This is a lot of time by computer standards and means that relays cannot be used at speeds of more than about 10 or 20 closures per second. (Even at a few closures per second, a relay's contacts do not last long if run continuously.)

To use the CoCo's built-in relay, therefore, you've got to give some consideration to treating it nicely without continuous high-speed switching unless you want to perform the laborious chore of replacing it. An *external* relay connected to the TD line or REM pins can have heavier duty if you're willing to replace it as required.

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Sugar Software

Sugar Software Gazette

Volume 1 Issue 3 Fall, 1989

The Calligrapher

Turn your CoCo or IBM PC into a calligrapher's quill. Make beautiful invitations, diplomas, certificates, love letters and labels. The Calligrapher can also be used for desktop publishing to print newsletters, flyers and ads. All this is possible with the Calligrapher which is now available for both OS9 or MS-DOS systems.

The Calligrapher is a text formatting program. It reads a text file which contains text and formatting codes and prints the text in graphics mode on a dot-matrix printer in various fonts.

The formatting codes tell the Calligrapher which font to use, when to change fonts, and all about centering, left, right or full justification, line fill, margin, line width, page size, page break and indentation. The new Calligrapher Version 2 adds support for multiple columns (like this ad), macros, page numbers, temporary indents, headers and footers, interactive prompting and more!

Calligrapher Fonts

The Calligrapher comes with three half-inch fonts (quarter-inch shown here):

Old English
Gay Nineties
Cartoon

The Calligrapher uses many different fonts (type styles) in both half-inch and smaller sizes. For example, this ad was formatted and printed with the Calligrapher using the Courrier fonts. About 150 other fonts are available on 15 disks sets or 5 economy packages.

The CoCo Calligrapher

The CoCo Calligrapher prints the same fonts as the OS9/MS-DOS Calligrapher. Though not as powerful, the CoCo Calligrapher is an easy to use, menu driven program for those CoCo owners that don't use OS9. It can print lines left justified or centered and can print in condensed mode on some printers.

Calligrapher Graphics

The popular Calligrapher programs now have graphics pictures, called Clipix that may be printed. These are specified in your text files similar to fonts. These Clipix pictures come about 65 to a disk. Each Clipix comes in a few different sizes and orientations. While the Clipix pictures are easier to include with the text using the OS9/MS-DOS Calligrapher, they may be printed using the CoCo Calligrapher, too.

Version 2

A new version of the Calligrapher is now available for OS9. Version 2 of the Calligrapher adds over 15 new directives over the Version 1.x. There is support for multiple columns by just specifying the width and length of the columns and the space between them. Also added are macros, temporary indents (useful around Clipix pictures), page numbers, headers and footers, and more. Upgrade old OS9 versions for $12.50.

MS-DOS Calligrapher

Calligrapher (Version 2) now lets owners of the IBM PC (and compatibles) have the same capabilities that the OS9ers have had for years. The MS-DOS font files are compatible with OS9, so if you have the OS9 Calligrapher and font files, you can buy the new MS-DOS Calligrapher and then simply copy your old OS9 font files to your PC! No other conversions are necessary. If you have CoCo Calligrapher font files, you will need to convert them to MS-DOS/OS9 format using the Calligrapher Massager program.

Calligrapher Massager

The Calligrapher Font Massager is a "tool" that allows you to do many things to Calligrapher font files. You may create new fonts, modify existing fonts, invert fonts, compress fonts, double the height and/or width, halve the height and/or width and convert between CoCo RS-DOS and OS9/MS-DOS formats. The Massager was used to create many of the Calligrapher fonts and Clipix pictures.

Prices

Specify the format desired: CoCo RS-DOS, OS9 or MS-DOS. The Font Massager is not available in CoCo RS-DOS format.

Callig. with the 3 fonts shown: $24.95
Calligrapher with ANY 2 Font Pkgs: $59.95
Callig, Massager, ALL 5 Font Pkgs: $129.95
Calligrapher Font Massager: $19.95
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A CoCo Relay Interface

The CoCo's built-in relay can be used easily by connecting an external device to the two REM leads from the cassette port. The easiest way to do this is to cannibalize a computer cassette recorder cable (Radio Shack Cat. No. 26-1207), changing the smallest plug (remote switch) to two alligator clips, as shown in Figure 6.

Connect the alligator clips to a second relay and battery as shown in the figure. The contacts of the second relay can then control automatic sprinklers, garage door manual switches, or AC appliances (with the cautions expressed in the warning above).

To use the circuit, just insert `MOTOR ON` and `MOTOR OFF` commands in a BASIC controlling program.

Another relay can be controlled by the TD line of the serial port. Use the CoCo serial extension cable (Radio Shack Cat. No. 26-3020), cutting off one end and using two alligator clips for the TD line and the ground line, as shown in Figure 7.

Connect the alligator clips to a relay as shown in the figure. A diode (Radio Shack Cat. No. 276-1101) must be placed in series with one of the relay leads so that the relay is turned on by either the positive or negative output, but not both. Without the diode the relay is on continuously (the relay is not polarized). No additional battery is needed. The contacts of this relay may now control small voltages and currents, or connect a second relay and battery, as shown in Figure 6, to control more extensive circuits.

To turn on this relay type in `POKE &HFF20,2`. Reverse the diode if the relay does not turn on. To turn off the relay type in `POKE &HFF20,0` from within a BASIC program.

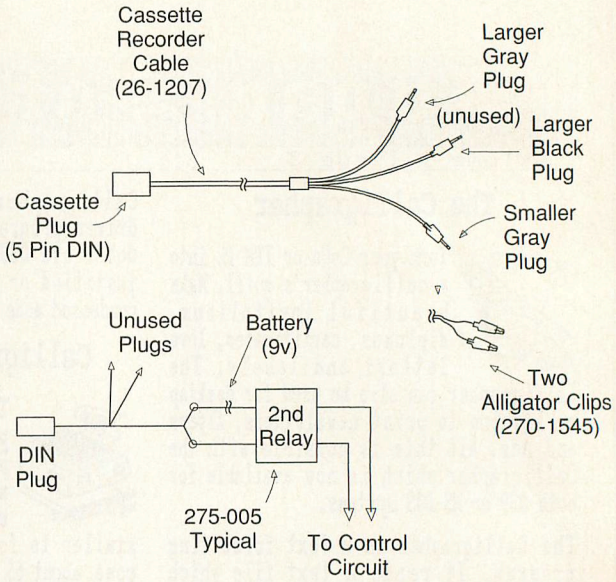

Figure 6: Using the Cassette Port REM Output

ROM Cartridge Port

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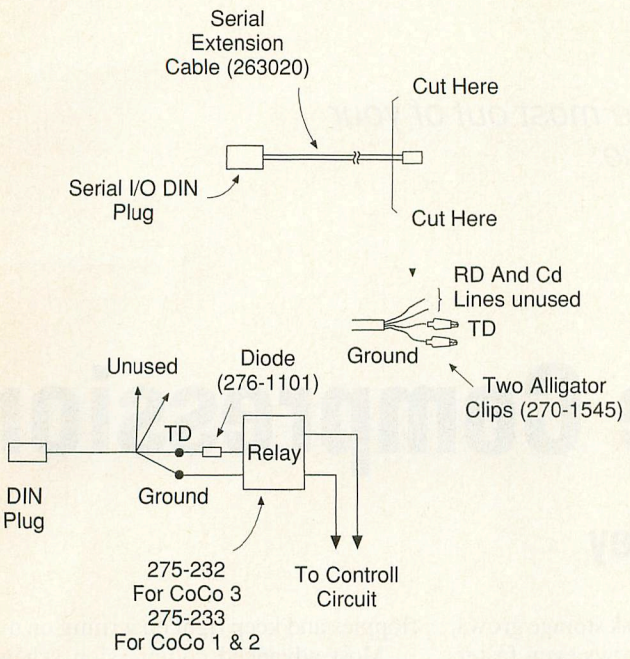

Figure 7: Using the Serial I/O Port TD Line

output) board that plugs into the ROM cartridge connector on your CoCo or slot in a Multi-Pak. Various RAINBOW advertisers offer the boards, and Tony DiStefano has covered the subject in his "Turn of the Screw" column.

Generally these boards provide 16 or so discrete Input/Output lines that can be programmed for input or output via BASIC or machine language programs. Relays or additional devices can be connected so the boards can be used to monitor real-world inputs or provide real-world control signals for many applications. A moderate amount of hardware knowledge is required to use these boards, however.

Another Option for Real-World Control

Radio Shack giveth and Radio Shack taketh away. A great product for CoCo control applications, the Plug 'n Power Appliance/Light Controller (Cat. No. 26-3142) that works in conjunction with the CoCo was discontinued by the Shack some time ago. It allows programming of the Plug 'n Power Remote Control Modules that control lamps, small appliances and dimmer switches. The controller is still available in some Radio Shack stores if you're interested (current price is $10, quite a reduction from the $100 original price).

With this controller you can truly program AC appliances without any fear of being electrocuted or having your Seiko watch case arc-welded to your CoCo chassis. Thanks to Zack Sessions of Castle Hayne, North Carolina, a Delphi regular, I have the programming guide to this beast. Let me know what you'd like to see here by writing to me at P.O. Box 3568, Mission Viejo, CA 92692. I'll be happy to write about how to program it.

And that's it for the odds and ends. Next month, more CoCo topics.

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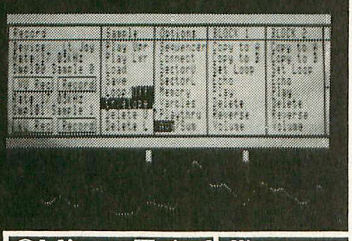

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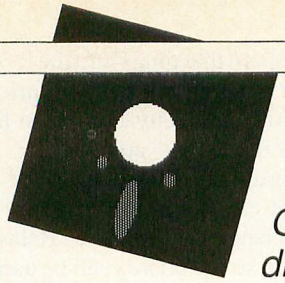
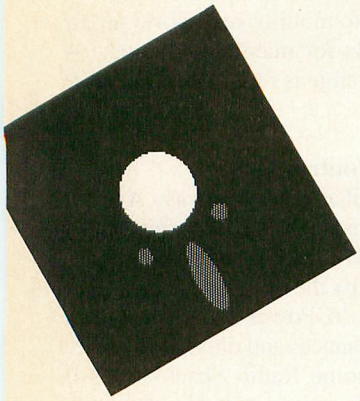
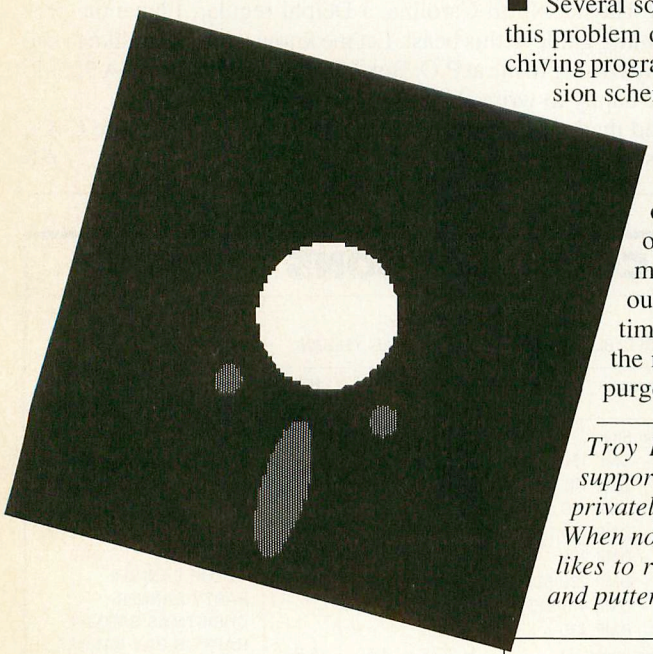


Getting the most out of your disk storage



Text File Compression

By Troy Brumley



It is ironic that as our disk storage grows, our ability to fill it grows even faster. Several solutions have been posed for this problem over the years, including archiving programs with advanced compression schemes and deleting or printing data no longer needed in machine-readable form.

While the last solution is one of the best, it is an easy one to forget. I usually remember it when I discover I'm out of floppies — again. By that time I'm too busy to go through the mess and figure out what to purge, so I just buy another box of floppies and keep right on writing on disk.

Most advanced compression schemes used in archiving programs rely on runs of repeating data and therefore only compress a subset of all possible files. Since most of my files are text-based, I need something to deal with English. The only pattern I see in my text files is a preponderance of blanks. Since they are randomly distributed, no obvious way to compress them exists — or does there?

Find a chart of the ASCII character set and note that while a byte holds any one of 256 characters, only 128 characters are defined by ASCII (0 through 127). In binary representation this means that the largest character value placed in a byte is 01111111. Since the first (left-most) bit is always 0, it is "wasted." That is one-eighth of all of your text files! There has to be a way to use that bit and free up space.

One approach is to compress the bit out of the file. By doing some clever shifts in

Troy Brumley works in software support for "The world's largest privately held software company." When not working on his CoCo 3, he likes to read, play with his children, and putter around the house.

Listing 1: Compress

```
PROCEDURE compress
0000      (*
0003      (* COMPRESS - Squeeze blanks out of text files.  This is
003B      (* done by setting the high order bit of the character
0071      (* following the blank and not writing the blank.  I/O is
00AA      (* via STDIN and STDOUT.  Statistics will be written to
00E1      (* STDERR.
00EB      (*
00EE      (* Regrettably the logic is not as clear as it could be
0125      (* since BASIC09 does not handle EOF on redirected input
015D      (* as well as it should.  My apologies for the GOTOs and
0195      (* line numbers.
01A5      (*
01A8      (* By Troy Brumley
01BA      (* .  8552 Huddleston Drive
01D5      (* .  Cincinnati OH 45236
```

```
01EE        (*
01F1
01F2        DIM c:BYTE
01F9        DIM bytein,byteout:REAL
0204        bytein=.0
020F        byteout=.0
021A        WHILE TRUE DO
0221          ON ERROR GOTO 100
0227          GET #0,c
0230          bytein=bytein+1.
023F          IF c<>$20 THEN
024C            PUT #1,c
0255            byteout=byteout+1.
0264          ELSE
0268            ON ERROR GOTO 10
026E            GET #0,c
0277            bytein=bytein+1.
0286            c=c+$80
0292            PUT #1,c
029B            byteout=byteout+1
02A7            GOTO 20
02AB 10         (*
02B1            c=$20
02B9            PUT #1,c
02C2            byteout=byteout+1.
02D1 20         (*
02D7          ENDIF
02D9        ENDWHILE
02DD 100    (*
02E3        PRINT #2," "
02EC        PRINT #2,"Bytes in  "; bytein
0302        PRINT #2,"Bytes out "; byteout
0318        END
```

Listing 2: Expand

```
PROCEDURE expand
0000        (*
0003        (* EXPAND - Restore blanks to text files.  This is done
003A        (* by scanning STDIN for bytes with the high order bit
0070        (* of a character on.  If this is found, write a blank
00A6        (* to STDOUT prior to the character (without the high
00DB        (* order bit!).  I/O is via STDIN and STDOUT.  Statistics
0114        (* will be written to STDERR.
0131        (*
0134        (* By Troy Brumley
0146        (* .  8552 Huddleston Drive
0161        (* .  Cincinnati OH 45236
017A        (*
017D
017E        DIM c,b:BYTE
0189        DIM bytein,byteout:REAL
0194        bytein=.0
019F        byteout=.0
01AA        b=$20
01B2        ON ERROR GOTO 100
01B8        WHILE TRUE DO
01BF          GET #0,c
01C8          bytein=bytein+1.
01D7          IF c>$7F THEN
01E4            PUT #1,b
01ED            byteout=byteout+1.
01FC            c=LAND(c,$7F)
0208          ENDIF
020A          PUT #1,c
0213          byteout=byteout+1.
0222        ENDWHILE
0226 100    (*
022C        PRINT #2," "
0235        PRINT #2,"Bytes in  "; bytein
024B        PRINT #2,"Bytes out "; byteout
0261        END
```

machine language, you can store eight characters in the space normally occupied by seven. However, this is harder to do in a higher-level language and seems too complex. Also, your files are impossible to recognize. This may be a benefit if you want security but is not too helpful for typical home or office users.

Since text files contain a high percentage of blanks, it might be a good idea to work on removing them from a file. The difficulty then lies in putting them back. Useful compression schemes must be reversible. One way to note that a blank used to be at a certain location is to use the wasted bit as a flag. If the bit is on (computerese for 1 as opposed to 0), a blank must precede or follow the current character.

After exploring the above possibility I decided to use the bit to mark that a blank should precede the current character. The decision was based on my belief that it would be easier to program the `Compress` and `Expand` tools that way.

The following listings are BASIC09 versions of `Compress` and `Expand`. While I have written versions in C, Pascal and even assembly, I believe BASIC09 has the widest appeal to other users since OS-9 Level II comes bundled with BASIC09. I keep packed versions of these in my `CMDS` directory and load `RunB` in my `StartUp`, so this is almost as fast as assembly language programs.

I use OS-9's redirection operators to connect the files to the program. To compress a file, enter:

`compress` <*bigfile* >*smallfile* `;del` *bigfile*

To expand the file again, enter:

`expand` <*smallfile* >*bigfile* `;del` *smallfile*

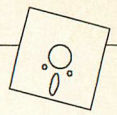
Those of you with pipes in your system may want to accomplish nothing with the command:

`compress` <*bigfile* `! expand >still` *bigfile*

These programs should prove useful to you. I find files are typically compressed by 15 to 20 percent in size, which is noticeable when you are a packrat like myself.

One final word of caution is in order. Make sure the file you compress uses only values below 127. Any special (i.e., foreign) characters above this number confuse the process as the high-order bit has already been set.

(Questions or comments concerning this program may be directed to the author at 8552 Huddleston Drive, Cincinnati, OH 45236. Please enclose an SASE when requesting a reply.)



MaxIc in Multi-Vue

By Dale L. Puckett
Rainbow Contributing Editor

Last month we presented Robert Moody's *MaxIc* on RAINBOW ON DISK because we wanted to get it into your hands as quickly as possible. Yet because the source code was too long to publish in one month, we needed a better way to present the actual listings. This month begins a three-part tutorial series that takes you on a step-by-step tour of *MaxIc*.

MaxIc's Parts

MaxIc is an excellent example of the power you can harness using the modular programming techniques made possible by BASIC09. (The program is made up of no less than 27 modules.) This month the source code listings from seven of these files are published, along with line-by-line comments to help you understand how *MaxIc* works.

The seven modules featured this month are: `MaxIc`, `Main`, `Menup`, `Setbuf`, `Clearbuf`, `Files` and `Showdir`. Additional *MaxIc* modules include: `Tandy`, `DirFiles`, `GetIcon`, `GetFile`, `SaveIcon`, `LoadIcon`, `ReadIcon`, `ShowIcon`, `WriteIcon`, `WriteFile`, `Editor`, `UpdatBuf`, `GetDir`, `Mouser`, `GetAns`, `GetKey`, `ErrMsg`, `GetName`, `WinSet` and `LoadBar`.

These modules were chosen so you could see some results after the first installment. After typing in the code from this month's column, you can see *MaxIc*'s menus and much of its screen presentation. You can also see how it displays your directory icons visually, an impressive feature.

Running MaxIc

Moody built *MaxIc* after studying the *MVShell* code from the July and August 1988 columns. It gives you constant access to the Tandy desk accessories menu as well as the standard Edit and File menus used in most *Multi-Vue* applications.

To run *MaxIc*, store the program's icon (which is included on RAINBOW ON DISK) in your `/dd/CMDS/ICONS` directory. Then store an AIF (Application Information File) containing the lines listed below in the directory you will be using when you run *MaxIc*. Name the file `AIF.mic`.

```
MaxIc
/dd/cmds/icons/icon.maxic
0
6
40
24
0
1
```

For example, this could be the directory you use to store all of your temporary icons. I store AIFs for the OS-9 applications I use the most in a directory named `/dd/TOOLS`.

After you have clicked on the MaxIc icon to run the program, *MaxIc* puts up its menu bar and draws its screen. First move the mouse over the DirFiles label on the menu bar, then push the mouse button down once. As soon as you release the mouse button, you'll see a menu with eight items pop down from the menu bar.

If you maintain a directory where you store a number of icons in addition to your standard `/dd/CMDS/ICONS` directory, click on CHI. When it asks, give *MaxIc* the path list to your special icons directory. If you want to edit an icon stored in `/dd/CMDS/ICONS`, simply point to Load Dir and push the mouse button down again. When you release it, you'll notice your disk drive begin to spin, and in a few moments up to 16 icons appear in the large window on the right-hand side of your screen.

To load one of these icons for editing, place the mouse pointer over the icon you want to edit and push the button down twice. Then, move the mouse pointer. You'll notice the arrow pointer has changed to the icon you pointed to when you moved the mouse. As you move across your tabletop, the icon you want to edit moves around on the screen.

If you move the icon over the MaxIc

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

icon at the top of the screen, it changes into a button that reads "Kill." If you push the mouse button while the Kill button is displayed, *MaxIc* deletes the icon file.

Now, move the pointer until your icon is located in the medium-sized box on the lower left side of the screen. When you move into the box, you'll notice the icon change into an Open button. As soon as the button reads "Open," you can push the mouse button again. When you do, you'll see the icon you want to edit pop into the small box in the upper-left hand corner of *MaxIc*'s screen. Then a "fat bits" representation of the icon is drawn in the medium-sized window.

To edit your icon, press the mouse button while the graphics cursor is showing in the medium-sized edit window. The Open button becomes cross hairs. Move the cross hairs to where you want a pixel to appear and push the mouse button down once. The new pixel appears on your screen (in the color of your choice) in the Color Selection box above the right-hand side of the Edit window.

If you want to draw the icon with a different color, move the pointer over the Color box and press the mouse button until the color you want to draw appears in the box. Then move the cross hairs back into the Edit box and finish drawing or editing the icon.

When your icon looks the way you want it, save it. Using *MaxIc*, this task is very intuitive. Simply move the mouse pointer until it's over the small box displaying your icon. Click the mouse button twice and then move the pointer, which now displays your icon, into the large directory window along the right-hand side of your screen. When the pointer arrives over the box you'll notice it changes to a Save button. When you see the Save button, push the mouse button and the icon is written into a file in the directory containing your icons.

Here's an alternate method you may use to save the icon: Move the mouse pointer up to the menu bar and press the button when the pointer is over the Files label. When the menu pops down, move the pointer over the Save menu entry and push the button down again. That's all there is to it. You may also print a hard copy of the Hex codes contained in your icon file by moving the mouse pointer over the Files menu and selecting the print entry.

If you have loaded an icon and want to leave the original icon file the way it is, click the mouse button over the Save As entry in the Files menu. *MaxIc* then asks you for a new filename. You'll save yourself a lot of work and find it's often much easier to edit an old icon rather than create a new one from scratch.

Looking at *MaxIc*'s Code

If you have already typed in the *MVShell* program from this column last summer — or better yet, *DoMenu* from last fall, you'll find you won't have to do too much typing to get the *MaxIc* module entered. I'll highlight the differences here.

The first nice touch Moody added to our *MVShell* code occurs at Line 0093 in the listing. First he uses *Gfx2* and OS-9's device window end call (`dwend`) to kill the window that called *MaxIc*. Then Moody creates a window of the type *MaxIc* needs and a color he likes with the device window set call (`dwset`). When the new window appears, *MaxIc* uses the *Gfx2* select call (`select`) to claim it as its own.

The next difference you'll notice appears in Line 016C where you'll see that Moody dimensioned an additional variable named `mn_Dfil`. This byte stores the value of *MaxIc*'s DirFiles menu.

The `_tanitms` entries are identical to *MVShell* and the other KISSable OS-9 code. They define the menu that lets you exercise the standard Tandy desk accessories while your program is running. Moody's file menu is constructed in a manner similar to mine. However, he gives you nine choices — Clear, Open, Save, Save As . . ., Abandon, Print, Quit, Read . . . and Write . . . — on his files menu.

At Line 04E8, you'll find the definition of *MaxIc*'s DirFiles menu items. This menu's selections include Write, ReName, Delete, CHI, Load Dir, CHD, CHX and Print. The code at Line 06D3 then defines the DirFiles menu.

As you near the end of the `MaxIc` module, you'll notice Moody replaces BASIC09's Intercept routine with his own — beginning at Line 0921. This lets him handle signals generated by the mouse. Once he has accomplished this, he merely runs `Main`, the program that choreographs *MaxIc*'s mouse-based antics. Notice he passes the value of the signal from the mouse to the procedure `Main` when he runs it.

Pondering Main

Now we have our work cut out for us. It's time to study the code that makes *MaxIc* tick. Our first stop is at Line 00DF. Here, Moody creates a new data type, which he uses to pass data back and forth between the 20-plus modules that make up *MaxIc*.

Moody has named his new BASIC09 data type `MicSys`. All data dimensioned as type `MicSys` holds two strings, each 48 bytes long. The fields containing the strings are named `Dname` and `Iname` — for directory name and icon name.

The two strings are followed by a 144-byte array, which holds the bit map that paints the image of the icon and several individual byte-wide variables, including `GrpId`, `BufNo`, `Number`, `MenSel`, `MenNum`, `ErrNum`, `Color` and `Scount`. Most of the latter are self-documenting, with `Scount` being a possible exception. `Scount` holds the number of times you have scrolled the directory window. Two integer fields complete the definition of the data type `MicSys`. They hold the horizontal and vertical position of the mouse pointer.

After Moody defined the data type `MicSys`, he reserved memory for a variable of type `MicSys` named `MS` using BASIC09's `DIM` statement. (`MS` uses 252 bytes of storage.) Demonstrating the power of BASIC09's parameter passing, Moody easily passes 252 bytes in 13 different fields between *MaxIc*'s procedures — and he does all this by passing just the one variable `MS`.

Moody comes up with a nice trick in Line 0172. Here he uses the `SysCall` routine to read a mouse packet, and then uses the information from the packet to set up *MaxIc* for the proper mouse resolution and side. It's an elegant approach I've never used.

When *MaxIc* returns from the `GetStt` system call at Line 01A2, the 24th byte of the array named `pac` contains the resolution, high or low, of the mouse, and the second byte of the packet contains information telling OS-9 which joystick port the mouse is plugged into.

With this information at his fingertips, Moody moved these two bytes into his simulated X register, `regs.x`, and used the `SS.GIP SetStt` call to set up the system for *MaxIc*. You'll notice that *MaxIc* is written in longhand, i.e, before *Gfx3*. We published *Gfx3* in August 1988 to help make our code shorter and easier to understand — not to mention easier to type. *MVShell*, after which *MaxIc* is modeled, was written before *Gfx3*.

If you are typing the procedures for *MaxIc* from scratch and are already using *Gfx3*, you may want to save yourself some typing. See the column that presented *Gfx3* for details, or take a look at *DoMenu* in last November's column to find out how to use *Gfx3*. Essentially you can replace this code:

```
regs.a:=0
regs.b:$89
regs.x:=addr(pac)
regs.y:=0
run SysCall($8D,regs)
```

with:

```
run gfx3("StdIn","gs.mous",addr(pac))
```

Notice the *Gfx3* calls are almost self-documenting — and much shorter. In our later KISSable OS-9 listings you'll also notice we usually create a number of vari-

ables that give us a mnemonic definition of the many obscure OS-9 SysCall values. For example, it is very hard to remember that $89 is the value that means SS_Mouse, but SS_Mouse is easy to remember.

You can have these mnemonic definitions at your fingertips by including a section of standard code at the beginning of your BASIC09 programs. First you dimension the variables. Then you assign the proper value to them. If you would like to make these mnemonic substitutions in *MaxIc*, see *DoMenu* in the November 1988 column or check out the listings of *Find* and *DirList* in the July 1989 column. They are ready for you to use.

Here are several short examples of the type of definition that can save you a lot of trouble if you need to read your code six months after you write it:

```
DIM Grp_Ptr, Ptr_Arr:BYTE
Grp_Ptr:=202
Ptr_Arr:=1
```

or:

```
DIM I_SetStt, I_GetStt, SS_MnSel:BYTE
I_SetStt:=$8E
I_GetStt:=$8D
SS_MnSel:=$87
```

Which notation is easier to remember?

Moody gives us another good example of BASIC09 code in the line marked 01FF. Here he uses the OS-9 Get Process ID system call (GrpID) to find out the ID number of the process running *MaxIc*. He then uses this number as the GrpID for his buffers. He does this because every OS-9 process running at any time has a unique ID. A group buffer ID of the same value is always unique. This trick eliminates buffer-numbering conflicts in your OS-9 programs.

Menup, SetBuf and ClearBuf are the first three procedures run by the procedure main. After running these procedures, *MaxIc* enters a continuous decision loop at Line 02B3.

Near the beginning of the loop, at Line 02EA, Moody uses the ms_sig SetStt call to set the value of the signal the mouse will return when you push the button. He then uses the OS-9 F$Sleep call to put *MaxIc* to sleep until the mouse button is pushed. When someone pushes the mouse button, *MaxIc* wakes up to find it must decide what to do.

As you run down the series of OS-9 system calls *MaxIc* uses on the next page, you'll begin to understand why we like to use mnemonic names for syscalls, etc. To study Moody's code, use a list of OS-9 GetStt and SetStt calls arranged in numeric order. Look at the value Moody puts in the field regs.b. The 6809 B register is

Editor's Note: The entire set of MaxIc procedures were presented on the August 1989 RAINBOW ON DISK. The files listed here are included on this month's RAINBOW ON DISK in source form. In addition, the AIF.mic file is stored in the SOURCE directory and the icon.maxic file is in the CMDS directory.

Listing 1: MaxIc

```
PROCEDURE MaxIc
 0000      (* see Dale Puckett June & July in the RainBow on MVShell &
Sigtesttwo *)
 0049      (* And Programmer's Notes, Chapter 9 & 10 in the Multi-Vue
Manual *)
 008D      ON ERROR GOTO 10
 0093      RUN gfx2(1,"dwend")
 00A3      RUN gfx2(1,"dwset",6,0,0,40,24,1,0,0)
 00CB      RUN gfx2(1,"select")
 00DC      DIM null,callcode,ErrNum:BYTE
 00EB      DIM endstr:STRING[1]
 00F7      null:=0
 00FE      endstr:=CHR$(null)
 0107      TYPE registers=cc,a,b,dp:BYTE; x,y,u:INTEGER
 012C      DIM regs:registers
 0135      DIM wt_fswin:INTEGER
 013C      wt_fswin:=2
 0143      DIM mnenbl,mndsbl:BYTE
 014E      mnenbl:=1 \mndsbl:=null
 015D      DIM winsync:INTEGER
 0164      winsync:=$C0C0
 016C      DIM mn_tndy,mn_file,mn_Dfil:BYTE
 017B      mn_tndy:=20 \mn_file:=21 \mn_Dfil:=130
 0190      TYPE mistr=_mnttl:STRING[15]; _mienbl:BYTE; _mires(5):BYTE
 01B1      DIM midscr:mistr
 01BA      TYPE mnstr=_mittl:STRING[15]; _mnid,_mnxsiz,_mnnits,_mnenabl
            :BYTE; _reser2,_mnitems:INTEGER
 01E6      DIM mndscr:mnstr
 01EF      TYPE wnstr=_wnttl:STRING[20]; _nmens,_wxmin,_wymin:BYTE;
_wnsync
            :INTEGER; _wnres(7):BYTE; _wnmen:INTEGER
 0224      DIM wndscr:wnstr
 022D      DIM _tanitms(9):mistr
 023B      _tanitms(1)._mnttl:="Calc"+endstr
 0250      _tanitms(1)._mienbl:=mnenbl
 025E      _tanitms(2)._mnttl:="Clock"+endstr
 0274      _tanitms(2)._mienbl:=mnenbl
 0282      _tanitms(3)._mnttl:="Calander"+endstr
 029B      _tanitms(3)._mienbl:=mnenbl
 02A9      _tanitms(4)._mnttl:="Control"+endstr
 02C1      _tanitms(4)._mienbl:=mnenbl
 02CF      _tanitms(5)._mnttl:="Printer"+endstr
 02E7      _tanitms(5)._mienbl:=mnenbl
 02F5      _tanitms(6)._mnttl:="Port"+endstr
 030A      _tanitms(6)._mienbl:=mnenbl
 0318      _tanitms(7)._mnttl:="Help..."+endstr
 0330      _tanitms(7)._mienbl:=mnenbl
 033E      _tanitms(8)._mnttl:="Shell"+endstr
 0354      _tanitms(8)._mienbl:=mnenbl
 0362      _tanitms(9)._mnttl:="Clipboard"+endstr
 037C      _tanitms(9)._mienbl:=mndsbl
 038A      DIM _filitms(9):mistr
 0398      _filitms(1)._mnttl:="Clear"+endstr
 03AE      _filitms(1)._mienbl:=mnenbl
 03BC      _filitms(2)._mnttl:="Open..."+endstr
 03D4      _filitms(2)._mienbl:=mnenbl
 03E2      _filitms(3)._mnttl:="Save"+endstr
 03F7      _filitms(3)._mienbl:=mnenbl
 0405      _filitms(4)._mnttl:="Save As..."+endstr
```

```
0420      _filitms(4)._mienbl:=mnenbl
042E      _filitms(5)._mnttl:="Abandon"+endstr
0446      _filitms(5)._mienbl:=mnenbl
0454      _filitms(6)._mnttl:="Print"+endstr
046A      _filitms(6)._mienbl:=mnenbl
0478      _filitms(7)._mnttl:="Quit"+endstr
048D      _filitms(7)._mienbl:=mnenbl
049B      _filitms(8)._mnttl:="Read..."+endstr
04B3      _filitms(8)._mienbl:=mnenbl
04C1      _filitms(9)._mnttl:="Write..."+endstr
04DA      _filitms(9)._mienbl:=mnenbl
04E8      DIM _Dfilms(8):mistr
04F6      _Dfilms(1)._mnttl:="Write"+endstr
050C      _Dfilms(1)._mienbl:=mnenbl
051A      _Dfilms(2)._mnttl:="ReName..."+endstr
0534      _Dfilms(2)._mienbl:=mnenbl
0542      _Dfilms(3)._mnttl:="Delete"+endstr
0559      _Dfilms(3)._mienbl:=mnenbl
0567      _Dfilms(4)._mnttl:="CHI..."+endstr
057E      _Dfilms(4)._mienbl:=mnenbl
058C      _Dfilms(5)._mnttl:="Load Dir"+endstr
05A5      _Dfilms(5)._mienbl:=mnenbl
05B3      _Dfilms(6)._mnttl:="CHD..."+endstr
05CA      _Dfilms(6)._mienbl:=mnenbl
05D8      _Dfilms(7)._mnttl:="CHX..."+endstr
05EF      _Dfilms(7)._mienbl:=mnenbl
05FD      _Dfilms(8)._mnttl:="Print"+endstr
0613      _Dfilms(8)._mienbl:=mnenbl
0621      DIM tndy_mn:mnstr
062A      tndy_mn._mittl:="Tandy"+endstr
063E      tndy_mn._mnid:=mn_tndy
064A      tndy_mn._mnxsiz:=10
0655      tndy_mn._mnnits:=9
0660      tndy_mn._mnenabl:=mnenbl
066C      tndy_mn._mnitems:=ADDR(_tanitms)
067A      DIM File_mn:mnstr
0683      File_mn._mittl:="Files"+endstr
0697      File_mn._mnid:=mn_file
06A3      File_mn._mnxsiz:=10
06AE      File_mn._mnnits:=9
06B9      File_mn._mnenabl:=mnenbl
06C5      File_mn._mnitems:=ADDR(_filitms)
06D3      DIM Dfil_mn:mnstr
06DC      Dfil_mn._mittl:="DirFiles"+endstr
06F3      Dfil_mn._mnid:=mn_Dfil
06FF      Dfil_mn._mnxsiz:=9
070A      Dfil_mn._mnnits:=8
0715      Dfil_mn._mnenabl:=mnenbl
0721      Dfil_mn._mnitems:=ADDR(_Dfilms)
072F      DIM menus(3):mnstr
073D      menus(1):=tndy_mn
0748      menus(2):=File_mn
0753      menus(3):=Dfil_mn
075E      wndscr._wnttl:="MaxIc"+endstr
0772      wndscr._nmens:=3
077D      wndscr._wxmin:=40
0788      wndscr._wymin:=24
0793      (* _wnres an array of seven reserverved byte sits here
07C9      wndscr._wnsync:=winsync
07D5      wndscr._wnmen:=ADDR(menus)
07E3      RUN gfx2(1,"curoff")
07F4      callcode:=$8E
07FC      regs.a:=1
0807      regs.b:=$86
0813      regs.x:=ADDR(wndscr)
0821      regs.y:=wt_fswin
082D      RUN syscall(callcode,regs)
083C      RUN gfx2("cwarea",0,1,39,22)
0856      TYPE IceptCode=StCode:BYTE; IntAddr:INTEGER;
RTIcode,sig:BYTE
0871      DIM SigHandler:IceptCode
087A      SigHandler.StCode:=$F7
```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almost always used to tell SysCall what type of GetStt or SetStt call you want to make. You'll find a description of all OS-9 GetStt and SetStt system calls in the "Technical Reference" section of your Tandy *OS-9 Level II* manual.

For example, if you look up the $89 used in Line 034A, you find it is the SetStt call GS_Mouse. In other words, SysCall is going to read the status of the mouse and place the information it finds in the data packet named pac.

Now let's take a closer look at *MaxIc*'s decision-making. The process starts at Line 03BD. The call here is SS_MnSel, telling you which menu the mouse was clicked over and which item was selected from that menu. Notice how Moody has carefully used the SS_UMBar call to make sure *MaxIc*'s menu bar is always updated.

At this point, if you move the mouse pointer over the menu bar, the value of MS.MenSel should be 0, 4, 5, 20, 21 or 130. If the value is 0, the mouse wasn't over a menu selection. If MS.MenSel is 4, the mouse driver wants to scroll the directory window up. When MS.MenSel is 5, the user wants to scroll down. An MS.MenSel value of 20 means someone has pushed down the mouse button when the pointer was located over the Tandy desk-accessory menu. Likewise a value of 21 means the mouse is over the Files menu. A value of 130 means the user wants to use the DirFiles menu.

Because OS-9 uses the graphics power built into WindInt to determine the action users want to take, all you have to do is write the code performing the action. OS-9 takes care of everything else. This makes life much easier. If you had to spend all your programming time writing menu handlers, you wouldn't have time to write your application.

In the middle of *MaxIc*'s decision loop you'll notice the program runs one of three other procedure files. The procedure run is determined by the location of the mouse when the button is pushed.

For example, if MS.Mensel is 20, *MaxIc* runs the procedure Tandy. We did not print this procedure this month because it is almost identical to the code in *DoMenu*. Refer to our November column if you would like to activate the Tandy menu before we publish Moody's code next month.

If the value of the MS.Mensel field is 21, *MaxIc* runs the procedure Files. We included it in this month's section so you have some good examples to use when writing any *Multi-Vue* program that reads or writes from disk files. We also held the procedure DirFiles for a future column in this three-part series.

In addition to the menu decisions, *MaxIc* must make other decisions based on where

```
0886      SigHandler.IntAddr:=ADDR(SigHandler)+4
0897      SigHandler.RTIcode:=$3B
08A3      DIM F_Icpt,I_SetStt:BYTE
08AE      DIM SS_Mouse:BYTE
08B5      DIM Follow:INTEGER
08BC      F_Icpt:=$09
08C4      I_SetStt:=$8E
08CC      SS_Mouse:=$89
08D4      Follow:=1
08DB      regs.a:=0
08E6      regs.b:=SS_Mouse
08F2      regs.x:=$0301
08FE      regs.y:=Follow
090A      callcode:=I_SetStt
0912      RUN syscall(callcode,regs)
0921      callcode:=F_Icpt
0929      regs.x:=ADDR(SigHandler)
0937      regs.u:=ADDR(SigHandler)+4
0948      RUN syscall(callcode,regs)
0957      RUN main(SigHandler.sig)
0964      END
0966 10   ErrNum:=ERR
096F      RUN errmsg(ErrNum)
0979      FOR t=1 TO 3000 \NEXT t
0997      END
```

Listing 2: main

```
PROCEDURE main
 0000      (* MaxIc (c) July 2 1988 *)
 001B      (* Robert Moody *)
 002D      (* 306 N. Cole *)
 003E      (* Molalla Oregon 97038)
 0056      (* (503) 829-4098 *)
 006A      (* A Icon Editor to make and change *)
 0090      (* Icons for use by Multi-Vue *)
 00B0      PARAM sig:BYTE
 00B7      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 00D2      DIM Ic,Dr:Mic
 00DF      TYPE MicSys=Dname,Iname(48):STRING;
Byt(144),GrpID,BufNo,number
           ,Mensel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 0128      DIM MS:MicSys
 0131      TYPE registers=dp,a,b,cc:BYTE; x,y,u:INTEGER
 0156      DIM regs:registers
 015F      DIM ok:BOOLEAN
 0166      DIM pac(32):BYTE
 0172      regs.a:=0
 017D      regs.b:=$89
 0189      regs.x:=ADDR(pac)
 0197      regs.y:=0
 01A2      RUN syscall($8D,regs)
 01B0      regs.a:=0
 01BB      regs.b:=$94
 01C7      regs.x:=pac(24)*256+pac(2)
 01DF      regs.y:=$FFFF
 01EB      RUN syscall($8E,regs)
 01F9      ON ERROR GOTO 10
 01FF      RUN syscall($0C,regs)
 020D      MS.GrpID:=regs.a
 021C      MS.Dname:="/dd/cmds/icons"
 0235      Dr.name:=""
 0240      Ic.name:=" "
 024C      MS.number:=0
 0257      MS.color:=1
 0262      MS.BufNo:=1
 026D      Dr.select:=0
 0278      Ic.select:=0
 0283      MS.scount:=1
 028E      RUN menup
```

```
0292      RUN setbuf(MS.GrpID)
029F      RUN clearbuf(MS,Dr,Ic)
02B3      LOOP
02B5 5      RUN gfx2("color",MS.color,0)
02D0        RUN gfx2("gcset",202,1)
02E3        sig:=0
02EA        regs.a:=0
02F5        regs.b:=$8A
0301        regs.x:=10
030C        RUN syscall($8E,regs)
031A        regs.x:=0
0325        RUN syscall($0A,regs)
0333        IF sig=10 THEN
033F          regs.a:=0
034A          regs.b:=$89
0356          regs.x:=ADDR(pac)
0364          regs.y:=0
036F          RUN syscall($8D,regs)
037D          MS.horiz:=pac(25)*256+pac(26)+MS.horiz/17
039F          MS.vert:=192*(pac(31)*256+pac(32))/176
03BD          regs.a:=0
03C8          regs.b:=$87
03D4          RUN syscall($8D,regs)
03E2          MS.Mensel:=regs.a
03F1          MS.MenNum:=regs.b
0400          regs.a:=0
040B          regs.b:=$95
0417          RUN syscall($8E,regs)
0425          IF MS.Mensel=2 THEN
0434            RUN getans(MS,ok,"Exit MaxIc")
0450            IF ok THEN
0459              Dr.name:="EnDxx"
0469            ENDIF
046B          ENDIF
046D          IF MS.Mensel=20 THEN
047C            RUN tandy(MS,Dr,Ic)
0490          ENDIF
0492          IF MS.Mensel=21 THEN
04A1            RUN files(MS,Dr,Ic)
04B5          ENDIF
04B7          IF MS.Mensel=130 THEN
04C6            RUN dirfiles(MS,Dr,Ic)
04DA          ENDIF
04DC          IF MS.Mensel=5 THEN
04EB            IF MS.scount+16<=MS.number THEN
0501              MS.scount:=MS.scount+16
0513              IF MS.scount>33 THEN
0522                MS.scount:=33
052D                GOTO 5
0531              ENDIF
0533              RUN gfx2("color",0)
0543              RUN gfx2("bar",290,20,636,188)
055C              Ic.select:=0
0567              Dr.name:=""
0572              RUN showdir(MS,Dr)
0581            ENDIF
0583          ENDIF
0585          IF MS.Mensel=4 THEN
0594            IF MS.scount>16 THEN
05A3              MS.scount:=MS.scount-16
05B5              IF MS.scount<1 THEN
05C4                MS.scount:=1
05CF                GOTO 5
05D3              ENDIF
05D5              RUN gfx2("color",0)
05E5              RUN gfx2("bar",290,20,636,188)
05FE              Ic.select:=0
0609              Dr.name:=""
0614              RUN showdir(MS,Dr)
0623            ENDIF
0625          ENDIF
0627          IF MS.horiz>32 AND MS.horiz<240 AND MS.vert>60 AND
```

the mouse is pointing on the screen. It does this by reading the value of the horizontal and vertical fields from the 32-byte array or packet of information from the mouse. It compares the values returned from the mouse with the values of known locations on the screen.

For example, at Line 0627 the code takes a look to see if the mouse pointer is located in the editing box. It can determine this because it knows where the mouse pointer is located. It also knows the editing box begins 32 pixels in from the left-hand side of the screen and is 210 pixels wide.

Additionally, *MaxIc* knows the editing box begins 60 pixels down from the top of the screen and is 225 pixels deep. A simple `IF ... THEN ... ENDIF` construct can answer the question quickly, especially if you throw in a few logical `AND` statements.

From this point on in the program, *MaxIc* is made up of a series of code sequences that check the location of the mouse pointer and react accordingly. It most often reacts by running another procedure, which takes care of the job at hand.

Putting the MenUp

The first added procedure *MaxIc* runs is `MenUp`. It creates the windows and draws the boxes that give *MaxIc* its visual personality. The code is straightforward and consists of a series of *Gfx2* commands. The *Gfx2* `OWSet` command is used to draw the three overlay windows used by *MaxIc*. Moody creates his overlay windows with a type of 0 so they remain on the screen.

After creating an overlay window, *MaxIc* calls the procedure `WinSet` (to be published next month). `WinSet` is a short procedure that runs `SysCall` to set the type of the overlay windows. It also draws the borders or scroll bars on the overlay windows. The type of window is determined by the number or parameter Moody passes to `WinSet`. You may want to predefine a mnemonic variable for each window type and use the variable name here instead of a number.

When `WinSet` has finished drawing the window borders, `MenUp` then closes the overlay window. But because the window was created while using the 0 byte as the first parameter, the borders remain on the screen after the window is closed. `MenUp` also uses the *Gfx2* color, bar, box and cursor movements commands to display its titles and dress up the *MaxIc* screen.

Sliding into SetBuf

`SetBuf` is a short BASIC09 procedure that loads several graphics images into buffers in your Color Computer's memory. The work is done by the *Gfx2* `GPLoad` command. The data statements are a Hex representation of the graphics images.

The best source of information about building graphic icons and generating data statements to represent them can be found in the last chapter of the *Rainbow Guide to OS-9 Level II: A Beginners Guide to Windows*. Our co-author, Peter Dibble, also presented a BASIC09 program to generate the data statements in the same chapter. The Clear and *MaxIc* icons, along with the Open, Save and Kill buttons are all generated from the data statements in `SetBuf`.

The `ClearBuf` procedure writes a series of null bytes or zeros into a graphics buffer. It receives the ID number of the buffer from Variable `MS`, which is a parameter of type `MicSys` that `ClearBuf` receives from *MaxIc* when it is run.

FILES and ShowDir

The procedure `FILES` is run when *MaxIc*'s `MenSel` syscall returns a value of 21. Depending on the item number selected, `FILES` goes to and runs one of nine subroutines. Those subroutines perform the action selected from the menu. For example, if you click the mouse button while the pointer is located over the Clear item, `FILES` goes to Line 1. It then runs the procedure `Getans`, which asks you if you want to clear the icon. If you answer yes, it runs the procedure `ClearBuf`.

Code in the remaining `FILES` subroutines opens icon files, saves them, saves them with a new name, abandons them, prints them, quits, reads them, or writes them to your screen or device. Notice how Moody has written an individual procedure to perform each of the common actions he needs.

For example, to write an icon file, *MaxIc* first prompts you for the name of the icon file you want to write by running the procedure `Getname`. Then it runs another procedure, `Writeicon`. When Moody writes another BASIC09 program, he is able to use some of these modules again.

Finally `ShowDir` is the procedure used to display the icons in your icons directory on the screen. `ShowDir` receives two parameters when it is called by *MaxIc* — `MS`, a variable of the type `MicSys` we described earlier and `DR`, a variable of type `Mic`. The first field of `DR` contains a string variable called `name`. It is followed by `select`, a single-byte variable and two integer fields that hold the *x* and *y* location of the mouse pointer.

The procedure `ShowDir` ends when there are no more icon files in the directory display and because of the code at Line 00D3, *MaxIc* knows if you try to show the icons in an empty directory. When you do this it ends and returns you to *MaxIc*. At Line 0116 `ShowDir` enters a `FOR ... NEXT` loop that prints four icons on a 42-pixel-

```
MS.vert
                <285 THEN
 0655            RUN editor(MS,Dr,Ic)
 0669           ENDIF
 066B           IF MS.horiz>10 AND MS.horiz<60 AND MS.vert>10 AND
MS.vert
                <35 THEN
 0698            RUN geticon(MS,Dr,Ic)
 06AC           ENDIF
 06AE           IF MS.horiz>170 AND MS.horiz<238 AND MS.vert>12 AND
MS.vert
                <30 THEN
 06DB            MS.color:=MS.color+1
 06ED            IF MS.color=4 THEN MS.color=0
 0706            ENDIF
 0708            RUN gfx2("color",MS.color)
 071D            RUN gfx2("bar",170,12,238,30)
 0734            RUN gfx2("color",LNOT(MS.color),MS.color)
 0751            RUN gfx2("box",170,12,238,30)
 0768            RUN gfx2("curxy",12,2)
 077B            PRINT MS.color
 0783            RUN gfx2("color",MS.color,0)
 079B           ENDIF
 079D           IF Dr.name="EnDxx" THEN
 07B1            BYE
 07B3           ENDIF
 07B5           IF MS.horiz>294 AND MS.horiz<633 AND MS.vert>20 THEN
 07DA            Dr.select:=(MS.horiz-294)/85+(MS.vert-20)/
42*4+MS.scount
 0807            IF Dr.select<=MS.number THEN
 081A              Dr.xpos:=(MS.horiz-294)/85*85+294
 0837              Dr.ypos:=(MS.vert-20)/42*42+20
 0852              Dr.name:=MS.Iname(Dr.select)
 0867              IF Dr.name="icon.XXXX" THEN
 087F                Ic.select:=0
 088A                Dr.name:=""
 0895                RUN showdir(MS,Dr)
 08A4              ELSE
 08A8                IF Dr.select=Ic.select THEN
 08BB                  RUN getfile(MS,Dr,Ic)
 08CF                  Dr.name:=""
 08DA                  Ic.select:=0
 08E5                ELSE
 08E9                  IF Ic.select>0 THEN
 08F8                    RUN
gfx2("put",MS.GrpID,Ic.select,Ic.xpos,Ic.ypos
                          )
 0923                   ENDIF
 0925                   RUN gfx2("color",3)
 0935                   RUN
gfx2("box",Dr.xpos,Dr.ypos,Dr.xpos+46,Dr.ypos
                         +24)
 0964                   RUN gfx2("fill",Dr.xpos+12,Dr.ypos+6)
 0984                   Ic.select:=Dr.select
 0993                   Ic.xpos:=Dr.xpos
 09A2                   Ic.ypos:=Dr.ypos
 09B1                 ENDIF
 09B3               ENDIF
 09B5             ENDIF
 09B7           ENDIF
 09B9         ENDIF
 09BB       ENDLOOP
 09BF 10    MS.ErrNum:=ERR
 09CC       RUN errmsg(MS.ErrNum)
 09D9       GOTO 5
```

Listing 3: `menup`

```
PROCEDURE menup
 0000       SHELL "tmode -echo"
 000F       RUN gfx2("owset",0,1,6,15,15,1,0)
```

```
0031      RUN winset(4)
0039      RUN gfx2("owend")
0046      RUN gfx2("owset",0,17,2,22,20,1,0)
0068      RUN winset(3)
0070      RUN gfx2("owend")
007D      RUN gfx2("owset",0,1,1,4,4,1,0)
009F      RUN winset(4)
00A7      RUN gfx2("owend")
00B4      RUN gfx2("color",1)
00C4      RUN gfx2("bar",170,12,238,30)
00DB      RUN gfx2("color",2,1)
00EE      RUN gfx2("box",166,10,242,32)
0105      RUN gfx2("box",170,12,238,30)
011C      RUN gfx2("curxy",12,2)
012F      PRINT "1";
0135      RUN gfx2("color",1)
0145      RUN gfx2("propsw","on")
0158      RUN gfx2("font",200,1)
016A      RUN gfx2("color",1,0)
017D      RUN gfx2("curxy",18,1)
0190      RUN gfx2("color",2)
01A0      PRINT USING "s30^","MaxIc (c) RomoSoft  V .01 .00"
01C9      RUN gfx2("color",1)
01D9      END
```

Listing 4: setbuf

```
PROCEDURE setbuf
 0000       PARAM grpid:BYTE
 0007       DIM byt,ErrNum:BYTE
 0012       DIM x,xx:INTEGER
 001D       ON ERROR GOTO 10
 0023       RUN gfx2("gpload",grpid,50,6,24,24,144)
 0045       byt:=0
 004C       (* load the clear buffer
 0064       FOR x:=1 TO 144
 0074         PUT #grpid,byt
 007E       NEXT x
 0089       RUN gfx2("gpload",grpid,51,6,24,24,144)
 00AB       FOR x:=1 TO 144
 00BB         READ byt
 00C0         PUT #grpid,byt
 00CA       NEXT x
 00D5       RUN gfx2("put",grpid,51,96,8)
 00EE       (* Josh
 00F6       DATA
$00,$00,$00,$00,$00,$00,$00,$00,$40,$40,$40,$00,$00,$00
            ,$11,$51
 013A       DATA
$00,$00,$00,$00,$05,$54,$00,$00,$00,$00,$14,$45,$00,$00
            ,$00,$00
 017E       DATA
$15,$55,$00,$00,$00,$04,$14,$05,$04,$00,$00,$14,$05,$54
            ,$05,$00
 01C2       DATA
$00,$01,$01,$50,$12,$A8,$00,$00,$40,$40,$42,$F8,$00,$00
            ,$15,$55
 0206       DATA
$02,$F8,$00,$00,$01,$50,$02,$A8,$00,$00,$01,$50,$00,$00
            ,$00,$01
 024A       DATA
$41,$50,$0A,$A8,$00,$44,$15,$50,$2B,$FA,$00,$50,$05,$50
            ,$2A,$AA
 028E       DATA
$00,$54,$05,$14,$2A,$AA,$00,$00,$14,$14,$2A,$AA,$00,$00
            ,$14,$14
 02D2       DATA
$2A,$AA,$00,$00,$15,$15,$2A,$AA,$00,$00,$00,$00,$0A,$A8
```


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high line until the window is filled with 16 icons.

Next month, we'll look at another seven or eight modules from the *MaxIc* package and then wrap up the series in the November issue.

This month's seven MaxIc files are enough to get you started. Next month, we'll look at another seven or eight modules from the MaxIc package and then wrap up the series in the November issue.

RGB and Disto Revisited

Last month I installed a new Disto 4-in-1 interface card on my Disto Super Controller II and was planning to drive the hard disk with new drivers from Roger Krupski at RGB Computer Systems in New York.

I've been running the combination for about a month now and it's fantastic! To take advantage of RGB's software, I backed up the data on the Seagate ST-225 hard disk that I had been driving with an SASI controller card, and replaced the controller with a brand new SCSI controller from RGB. I then reformatted the drive.

This change let me set up the hard disk with 10 standard 35-track, single-sided floppy disks and one giant OS-9 hard disk holding more than 19½ megabytes of data. Many people who buy the RGB system split the disk in half and emulate several hundred standard Tandy floppy disks on their drive. They leave the other half free

```
          ,$00,$00
0316      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
035A      FOR xx:=52 TO 54
036A       RUN gfx2("gpload",grpid,xx,6,24,24,144)
038E       FOR x:=1 TO 144
039E         READ byt
03A3         PUT #grpid,byt
03AD       NEXT x
03B8      NEXT xx
03C3      END
03C5      (* open
03CC      DATA $00,$00,$00,$00,$00,$00,$AA,$AA,$AA,$AA,$AA,$A8,$80,$00
          ,$00,$00
0410      DATA $00,$08,$80,$00,$00,$00,$00,$08,$85,$51,$54,$55,$10,$48
          ,$84,$11
0454      DATA $04,$40,$10,$48,$84,$11,$04,$40,$14,$48,$84,$11,$04,$40
          ,$14,$48
0498      DATA $84,$11,$54,$54,$14,$48,$84,$11,$00,$40,$11,$48,$84,$11
          ,$00,$40
04DC      DATA $11,$48,$84,$11,$00,$40,$11,$48,$84,$11,$00,$40,$10,$48
          ,$84,$51
0520      DATA $00,$55,$10,$48,$80,$00,$00,$00,$00,$08,$80,$00,$00,$00
          ,$00,$08
0564      DATA $AA,$AA,$AA,$AA,$AA,$A8,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
05A8      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
05EC      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0630      (* save
0637      DATA $00,$00,$00,$00,$00,$00,$AA,$AA,$AA,$AA,$AA,$A8,$80,$00
          ,$00,$00
067B      DATA $00,$08,$80,$00,$00,$00,$00,$08,$85,$51,$54,$41,$15,$48
          ,$84,$01
06BF      DATA $04,$41,$10,$08,$84,$01,$04,$41,$10,$08,$84,$01,$04,$41
          ,$10,$08
0703      DATA $85,$51,$54,$41,$15,$08,$80,$11,$04,$41,$10,$08,$80,$11
          ,$04,$41
0747      DATA $10,$08,$80,$11,$04,$41,$10,$08,$80,$11,$04,$55,$10,$08
          ,$84,$51
078B      DATA $04,$14,$15,$48,$80,$00,$00,$00,$00,$08,$80,$00,$00,$00
          ,$00,$08
07CF      DATA $AA,$AA,$AA,$AA,$AA,$A8,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0813      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0857      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
089B      (* kill
08A2      DATA $00,$00,$00,$00,$00,$00,$AA,$AA,$AA,$AA,$AA,$A8,$80,$00
          ,$00,$00
08E6      DATA $00,$08,$80,$00,$00,$00,$00,$08,$84,$11,$50,$40,$10,$08
          ,$84,$10
092A      DATA $40,$40,$10,$08,$84,$40,$40,$40,$10,$08,$84,$40,$40,$40
          ,$10,$08
096E      DATA $85,$00,$40,$40,$10,$08,$84,$40,$40,$40,$10,$08,$84,$40
          ,$40,$40
09B2      DATA $10,$08,$84,$40,$40,$40,$10,$08,$84,$10,$40,$40,$10,$08
          ,$84,$11
09F6      DATA $50,$55,$15,$48,$80,$00,$00,$00,$00,$08,$80,$00,$00,$00
          ,$00,$08
0A3A      DATA $AA,$AA,$AA,$AA,$AA,$A8,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0A7E      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0AC2      DATA $00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00,$00
          ,$00,$00
0B06 10    ErrNum:=ERR
0B0F       RUN errmsg(ErrNum)
0B19       END
```

Listing 5: clearbuf

```
PROCEDURE clearbuf
 0000      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 001B      TYPE MicSys=Dname,Iname(48):STRING;
byt(144),GrpId,BufNo,number
           ,MenSel,MenNum,color,scount:BYTE; Horiz,Vert:INTEGER
 0060      PARAM ms:MicSys
 0069      PARAM Dr,Ic:Mic
 0076      DIM x:INTEGER
 007D      ON ERROR GOTO 10
 0083      BASE 0
 0085      RUN gfx2("color",0)
 0095      RUN gfx2("bar",30,59,246,179)
 00AC      RUN gfx2("color",1)
 00BC      RUN gfx2("gpload",ms.GrpId,49,6,24,24,144)
 00E1      FOR x:=0 TO 143
 00F1        ms.byt(x):=0
 00FF        PUT #ms.GrpId,ms.byt(x)
 0113      NEXT x
 011E      RUN gfx2("put",ms.GrpId,50,26,13)
 013A      END
 013C 10   RUN errmsg
 0143      END
```

Listing 6: FILES

```
PROCEDURE FILES
 0000      TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 001B      TYPE MicSys=Dname,Iname(48):STRING;
```

for OS-9. But, you know my priorities! I only needed 10 standard Tandy drives.

The RGB system was easy to install. Krupski's hard disk driver, `hdisk.dr` is installed by using `OS9Gen` to generate a new `OS9Boot` file on a fresh disk. The power of the system is unleashed later.

But before you run `OS9Gen`, it's best to patch the `INIT` module to change the `/d0` to a `/dd`. Krupski supplies a program to do this for you. Then, you patch `CC3Go` and change the `/h0` and `/h0/CMDS` to `/dd` and `/dd/CMDS`.

After you have run `OS9Gen` and have a new OS-9 floppy boot disk, do a cold reset of your Color Computer to return to RS-DOS — or RGB-DOS, to be more precise. It is located on the chip you plug into the EPROM socket of your Super Controller II. You then type RGB's `DRIVE OFF` command to turn off Drive 0 and Drive 1 on the hard disk. After this you are able to access floppy Drive 0 and floppy Drive 1.

Once you have access to your floppy disk drive, insert your new boot disk into Drive 0 and make a backup from Drive 0 to any one of the simulated Tandy floppy drives located on the new hard drive. I chose Drive 5. Once the backup is complete, run a program from RGB named `LINK.BAS`. This program calculates the absolute `LSN` in which the bootfile resides

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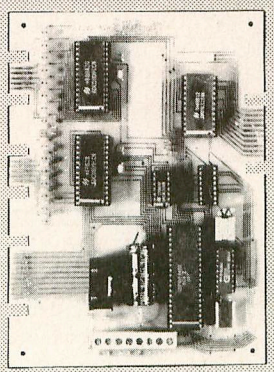

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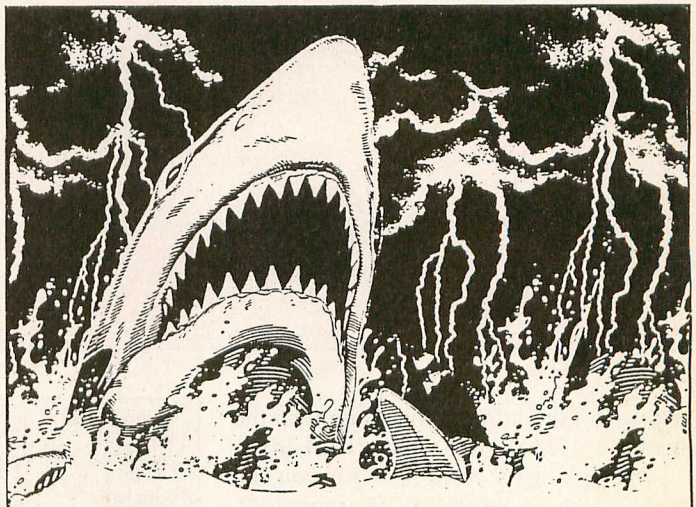

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```
Byt(144),GrpId,BufNo,number
          ,Mensel,MenNum,ErrNum,color,scount:BYTE;
horiz,vert:INTEGER
 0064       PARAM MS:MicSys
 006D       PARAM DR,IC:Mic
 007A       DIM TName:STRING
 0081       DIM OK:BOOLEAN
 0088       ON ERROR GOTO 30
 008E       ON MS.MenNum GOTO 1,2,3,4,5,6,7,8,9
 00BC       END
 00BE 1     (* clear
 00C9       RUN getans(MS,OK,"Clear Icon")
 00E5       IF OK THEN
 00EE         RUN clearbuf(MS,DR,IC)
 0102       ENDIF
 0104       GOTO 20
 0108 2     (* open
 0112       DR.name:=""
 011D       RUN getname(TName)
 0127       IF TName<>"" THEN
 0133         IC.name:=TName
 013F         RUN loadicon(MS,DR,IC)
 0153         DR.name:=""
 015E       ENDIF
 0160       GOTO 20
 0164 3     (* save
 016E       RUN saveicon(MS,DR,IC)
 0182       RUN showdir(MS,DR)
 0191       GOTO 20
 0195 4     (* save as
 01A2       RUN getname(TName)
 01AC       IF TName="" THEN
 01B8         GOTO 20
 01BC       ELSE
 01C0         IC.name:=TName
 01CC         RUN saveicon(MS,DR,IC)
 01E0         RUN showdir(MS,DR)
 01EF       ENDIF
 01F1       GOTO 20
 01F5 5     (* abandon
 0202       RUN getans(MS,OK,"Abandon "+IC.name)
 0223       IF OK THEN
 022C         IC.name:=" "
 0238         RUN clearbuf(MS,DR,IC)
 024C         RUN gfx2("curxy",5,5)
 025F         PRINT "                    "
 0276       ENDIF
 0278       GOTO 20
 027C 6     (* print
 0287       IF IC.name<>"" THEN
 0296         TName:="/p"
 029F         RUN writeicon(TName,IC.name,MS.Byt)
 02B9       ENDIF
 02BB       GOTO 20
 02BF 7     (* quit
 02C9       RUN getans(MS,OK,"Quit MaxIc")
 02E5       IF OK THEN
 02EE         DR.name:="EnDxx"
 02FE       ENDIF
 0300       GOTO 20
 0304 8     (* read
 030E       RUN getname(TName)
 0318       IF TName="" THEN
 0324         GOTO 20
 0328       ELSE
 032C         IC.name:=TName
 0338         RUN readicon(MS,DR,IC)
 034C       ENDIF
 034E       GOTO 20
 0352 9     (* write
 035D       RUN getname(TName)
 0367       IF TName="" THEN
 0373         TName:=IC.name
 037E         IF TName=" " THEN
 038B           GOTO 20
 038F         ENDIF
 0391       ENDIF
 0393       IC.name:=TName
 039F       RUN getans(MS,OK,"Write "+IC.name)
 03BE       IF OK THEN
 03C7         RUN writeicon(IC.name,TName,MS.Byt)
 03E1         RUN gfx2("color",1)
 03F1         RUN gfx2("curxy",5,5)
 0404         PRINT USING "s15^",IC.name
 0414       ENDIF
 0416 20    END
 041B 30    MS.ErrNum:=ERR
 0428       RUN errmsg(MS.ErrNum)
 0435       END
```

and writes the information along with the boot file size to LSN 0 of your hard drive.

Once you have run LINK.BAS, you can boot OS-9 from the hard disk by typing DOS 5. Yet life can be simpler.

To take the process one step further, you may then use the RGB DRIVE ON command to turn Drive 0 and Drive 1 on the hard disk back on. Then type the one-line command above plus DOS 5 and save it in a file named AUTOEXEC. From this point on, all you need to do to boot OS-9 is turn on your Color Computer and hard disk drive. Does it get any better?

The boot file must still be contiguous, and you must always OS9Gen on to a floppy formatted as a 35-track, single-sided disk so it may be backed up by the Tandy BACKUP command.

Listing 7: showdir

```
PROCEDURE showdir
 0000       TYPE Mic=name:STRING; select:BYTE; xpos,ypos:INTEGER
 001B       TYPE MicSys=Dname,Iname(48):STRING;
Byt(144),GrpID,BufNo,Number
          ,MenSel,MenNum,ErrNum,color,scount:BYTE; horiz,vert:INTEGER
 0064       TYPE registers=dp,a,b,cc:BYTE; x,y,u:INTEGER
 0089       PARAM MS:MicSys
 0092       PARAM DR:Mic
 009B       DIM regs:registers
 00A4       DIM count:BYTE
 00AB       DIM h,v:INTEGER
 00B6       DIM hcor,vcor:INTEGER
 00C1       DIM Tname:STRING[6]
 00CD       ON ERROR GOTO 10
 00D3       IF MS.Number=0 THEN
```

```
00E2        END
00E4      ENDIF
00E6      count:=MS.scount
00F1      RUN gfx2("font",200,2)
0103      RUN gfx2("gcset",0,0)
0116      FOR v:=20 TO 150 STEP 42
012B        FOR h:=294 TO 550 STEP 85
0142          RUN gfx2("put",MS.GrpID,count,h,v)
0164          hcor:=h/12-1 \vcor:=(v+34)/9
0180          Tname:=RIGHT$(MS.Iname(count),LEN(MS.Iname(count))-5)
019C          RUN gfx2("color",1,0)
01AF          IF Tname="XXXX" THEN
01BF            RUN gfx2("line",h,v,h+46,v+22)
01E3            RUN gfx2("line",h,v+22,h+46,v)
0207          ENDIF
0209          RUN gfx2("curxy",hcor,vcor)
0220          PRINT USING "s7^",Tname;
022D        EXITIF count>=MS.Number THEN
023D          h:=550
0245          v:=150
024C        ENDEXIT
0250          IF DR.name=MS.Iname(count) THEN
0266            RUN gfx2("color",3)
0276            RUN gfx2("box",h,v,h+46,v+23)
0299            RUN gfx2("fill",h+12,v+6)
02B3          ENDIF
02B5          count:=count+1
02C0        NEXT h
02CB      NEXT v
02D6      RUN gfx2("curxy",0,0)
02E9      RUN gfx2("font",200,1)
02FB      regs.a:=1
0306      regs.b:=$88
0312      regs.x:=0
031D      vcor:=MS.Number/MS.scount
032F      regs.y:=20/vcor
033E      RUN syscall($8E,regs)
034C      RUN gfx2("color",2,0)
035F      END
0361 10   MS.ErrNum:=ERR
036E      RUN gfx2("font",200,1)
0380      RUN errmsg(MS.ErrNum)
038D      END
```

If you are using the RGB / Disto system configured like this, you no longer need to worry about having `Shell` and `GrfDrv` in a `CMDS` directory on the boot disk. Because you patched `CC3Go`, OS-9 looks for those files on the hard drive — device `/dd`.

If you buy your hard drive from RGB, Roger will configure it before he ships it. This means you can simply plug the cable into your Disto 4-in-1 card and run it. It's fantastic.

And, Finally!

The latest issue of *MOTD* from Editor Bill Brady and the OS-9 Users Group was fantastic. Brady keeps on making this publication better. The issue we just received featured *Rave* — a real-time audio/video environment from Microware. It's the user interface of the future for OS-9 68K systems and includes three packages — a graphics file manager, graphics support library and presentation editor — all implemented as extensions to Microware's OS-9 real-time operating system.

Another highly recommended article in this *MOTD* is Microware's "White Paper," describing OS-9 signals. Reading this article is a good way to learn about OS-9 interprocess communications. For information about the OS-9 Users Group, write them at 1715 East Fowler Ave., Suite R237, Tampa, FL 33612. Allow four to six weeks for your application to be processed.

And speaking of the Users Group, it's time to tip our hat to a new slate of officers. Your new president is Kevin Darling. Bruce Isted is the vice president. Bill Turner was elected secretary and George Dorner was elected to continue as OS-9 UG treasurer. Congratulations to one and all. Stand by — you're going to see some exciting developments from these guys soon!

That's it for September. Until October and another installment of *MaxIc* — keep on hacking!

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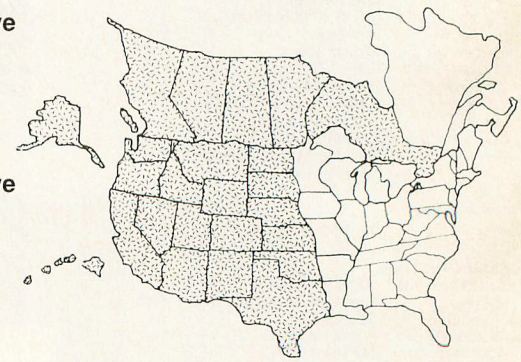

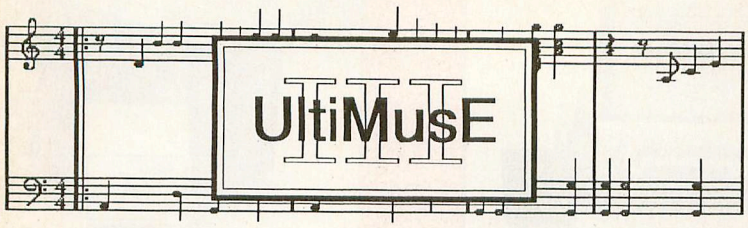

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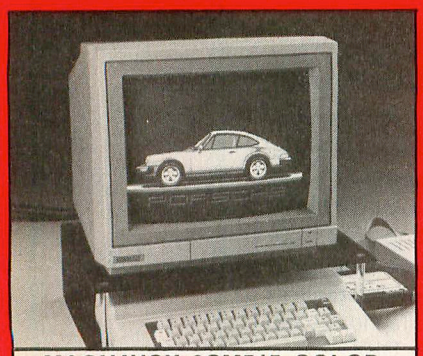
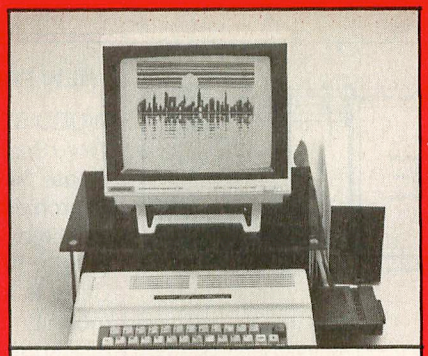


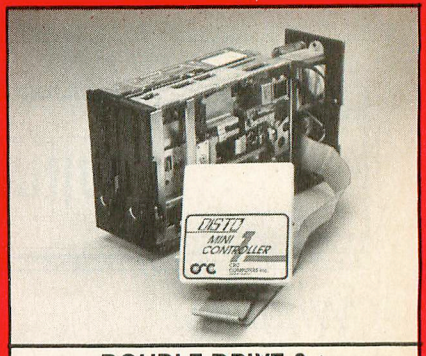
MAGNAVOX 8CM515 COLOR
- 80 Column
- Use with Coco, Tandy 1000's, IBM PC

CC-3 RGB cable 19.95
$269 (14 ship)



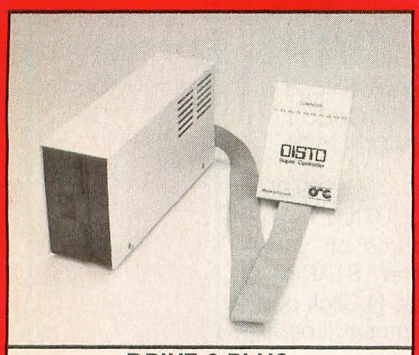
MAGNAVOX 7622 AMBER
- 80 Column
- Built in Speaker

$98 (7 ship)



DOUBLE DRIVE 0 +
- Two double side 360K Teac 55B
- Disto controller & cable

$310 (8 ship)

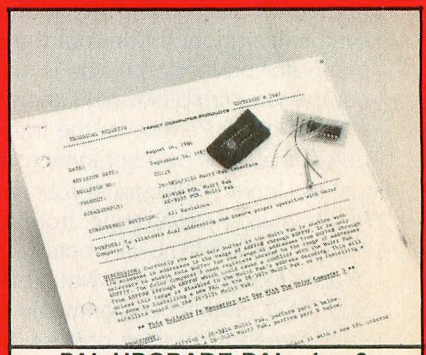


DRIVE 0 PLUS
- Double sided 360K MPI 52
- Disto Controller and cable

$178.45 (5 ship)

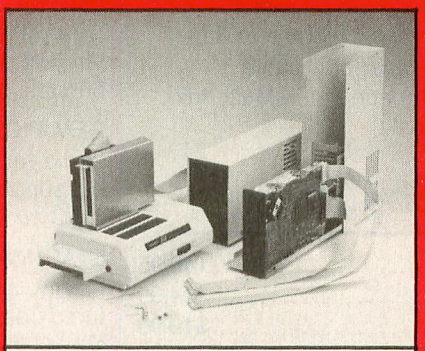
STAR NX-1000R COLOR
- Built in back tractor paper feed
- Joe Walker Star Max Color printer driver and SP-C converter add $40

$249 (5 ship)



PAL UPGRADE PAL - 1 or 2
Makes multi-pack interface work with CoCo 3. Specify 26-3024 or 26-3124. $14.95 (2 ship)

A. DISTO 3 in 1 Board	$59.45
B. DISTO MEB	$30.00
C. DISTO RS-232	$49.95



20,000,000 Bytes or the equivalent to 125 R.S. 501's on line are packed into this hard drive, pre installed and ready to run. This complete, easy to use package includes a Seagate 20 Meg Hard Drive, a DTC 5150 Controller and interface,* heavy duty case & power supply, and a 1 year warranty. This 20 meg Hard Drive will also work with Tandy and IBM clones. Basic driver, $29.95, lets you access this hard drive without need for OS-9. New Case with FAN.

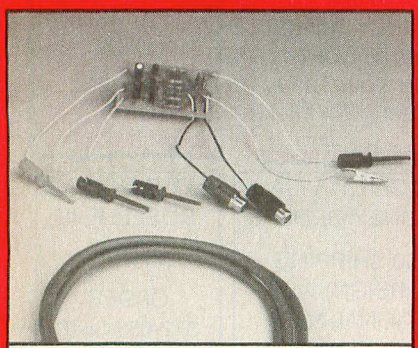
(9 ship)

HD-1 20 Meg	$499
HD-2 30 Meg	$549
HD-3 40 Meg	$598

*Burke & Burke

30 Day Money Back Guarantee

Howard Medical's 30-day guarantee is meant to eliminate the uncertainty of dealing with a company through the mail. Once you receive our hardware, try it out; test it for compatability. If you're not happy with it for any reason, return it in 30 days and we'll give your your money back (less shipping.) Shipping charges are for 48 states. APO, Canada and Puerto Rico orders are higher.



VIDEO AMPLIFIER VA-1
required in CoCo 1 or 2 to drive monitor $29.45 (2 ship)

Howard Medical Computers
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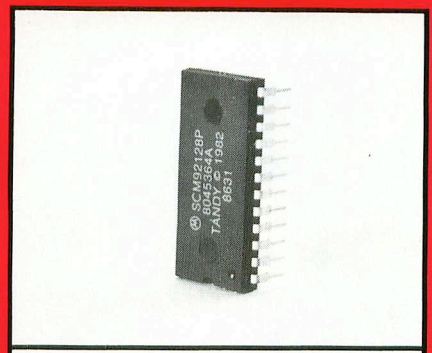
STAR NX 1000

- Dot Matrix; 144 CPS
- Back Tractor & Friction Feed

Needs SP-C **$189** (5 ship)



RS 1.1 DOS

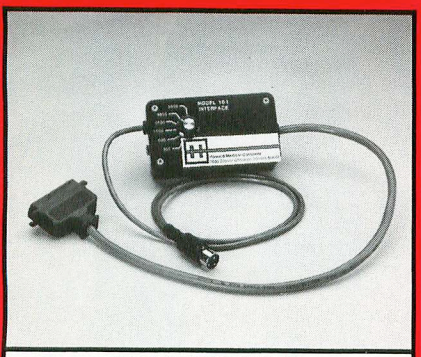
- ROM Chip for Disk Controller
- Works for CoCo 2 or 3

$25 (2 ship)

TEAC 55B

- 360K Double Sided Half Ht. Floppy
- Fits R.S. 501

$98 (2 ship)



HOWARD SP-C

- Serial to Parallel Converter
- Connect CoCo to Parallel Printer

$68.45 (2 ship)

RICOH RF800

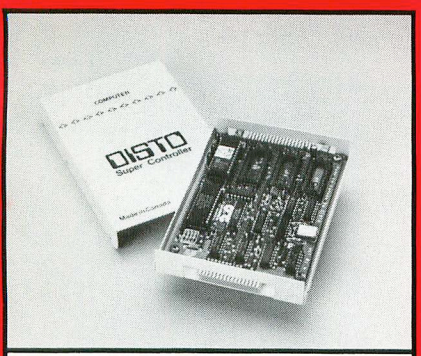
- Group 3 & 2 Compatible
- 200 by 200 Resolution

$695 (7 ship)

BROTHER M-11 PRINTER

- Built-in Serial & Parallel Interface
- Dot Matrix: Tractor/Fricton Feed

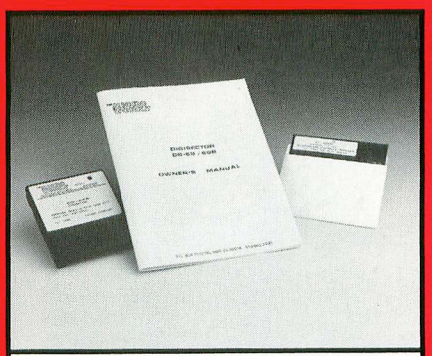
$156 (5 ship)



DISTO DC-3

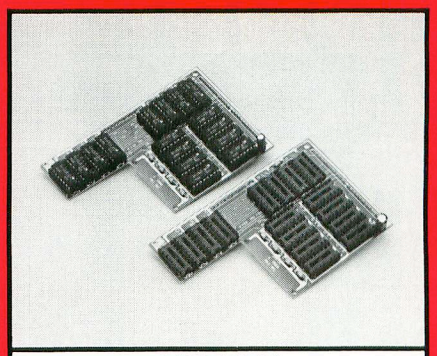
- Original Disto Controller
- 2 ROM Slots; Gold Platted Contacts

$98 (2 ship)



MICRO WORKS DIGITIZER

- DS-69B Color 1.5 Second/Picture **$150**
- DS-69 B&W 2 Second/Picture **$100**



MEMORY

- 512K Bare Board $40
- Populated 512K & Software $119
- 64K 8 Chip for CoCo 2 $30

DISTO DC-7

- Mini Disk Controller for CoCo 1, 2, 3
- Includes RS 1.1. Modifyed to access DS Drives

$75 (2 ship)

Y CABLE **$28**

WORD PAK - RS **$49**

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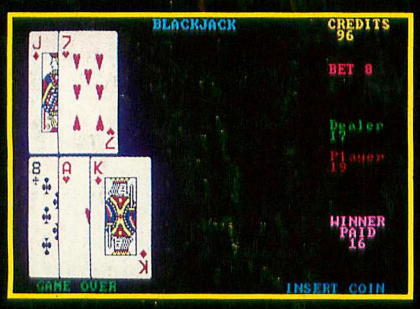
Slots & Cards

VGA Graphics Depicted



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